1963

Comparison of written and spoken language from deaf and hearing children at five age levels

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COMPARISON OF WRITTEN AND SPOKEN LANGUAGE FROM DEAF AND HEARING CHILDREN AT FIVE AGE LEVELS

by

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A dissertation presented to the Graduate Board of Washington University in partial fulfillment of the requirements for the degree of Doctor of Education

June, 1963

Saint Louis, Missouri

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CHAPTER I

INTRODUCTION TO THE PROBLEM

The present study is an attempt to compare the development of certain aspects of language of hearing and deaf children in order to reveal the importance of one avenue of sensory experience, hearing, on the growth of spoken and written language structure.

While language acquisition is one of the most important aspects of any child's development, it is the very keystone of a deaf child's education. The uneducated deaf person acquires no language and for those who are taught, language is only achieved through laborious special training. Even with that education, language performance is difficult for some deaf children. It has been said that their language behavior is like a tangled web in which words occur in profusion but do not align themselves in orderly fashion (Fusfeld, 1954). For other deaf children, structures remain simple and short (Heider and Heider, 1940). For some, only concrete words assume meaning (Wells, 1940), and for others, some categories of words never become useful (Myklebust, 1960).

Since language is basically an auditory-vocal process, the individual deprived of hearing is consequently denied the

normal means of language acquisition. He must, therefore, receive stimuli, ordinarily intended for the ear, through other sense modalities. In short, deaf children must be taught language in an ingeniously contrived environment unlike that of the hearing child who experiences language in his auditory environment from an early age. Nevertheless, the importance of language remains the same for the deaf and hearing alike.

The goals of language acquisition for deaf children might be established by the accomplishments of hearing children. However, comparison of the two types of children is not easy since satisfactory tools of measurement are not available.

In order to communicate about language, it is necessary to establishment attributes of language that can be described and quantified. The conventional features of language concern grammar, spelling, reading, speech content, and the like. These are inadequate to describe those features of language that determine the ways in which it is taught to those children deprived of the sense modality essential for its acquisition.

Crucial for description and hopefully for improvement of teaching language to deaf children are the lexical and structural aspects of language. Unfortunately methods for describing and measuring these attributes of language for deaf or hearing children are hardly available. Were the methods available they could be applied to spoken and written language alike and

should provide a basis for analysis of the interrelation of spoken and written language.

If satisfactory tools for description and quantification of spoken and written language of deaf and hearing children can be developed, this would be helpful in making analysis for diagnostic and consequently technical purposes.

Briefly then, language is important. In order to communicate about it, there is a need to describe and quantify it. There is further need to have a basis for comparison between children who acquire language through auditory experiences and children who are taught language because they are deaf. A method of analyzing the language development of deaf children would be helpful both for diagnosis and instruction.

Related Research

Although there has been an increasing number of studies of language in recent years, most investigations have been of the spoken output of children under age eight, and the written behavior of school age children. While it is true that the essentials of spoken and written expression are almost identical--that is, that any statement should be made up of words that say clearly and precisely what is meant in the syntax of correct grammar--it is indeed possible that in an oral society where written expression is the secondary form (Sapir, 1921), one form of language may reflect more environmental and/or instructional pressure than the other.

There is a prodigious number of investigations in the area of language analysis, and they range in subject from the study of units of use as small as the phonome (Irwin, 1941), to those as gross as total composition description (Willing, 1926). However, one measure more than others has been employed in several studies and that measure is sentence length, which has been described as reliable and easily determined (McCarthy, 1954). In all developmental studies, sentence length shows an increase with increase in age (Davis, 1937; McCarthy, 1930; Templin, 1957).

The ratio of subordination, which is the ratio of dependent to independent clauses, is an index used by some (Harrell, 1957; La Brant, 1933) in the analysis of sentence structure. It is the one measure that has been used to describe both forms of expression of the same population (Harrell, 1957).

Various methods of determining indices of verbal diversification and flexibility have been employed (Boder, 1940; Mann, 1944), but probably the most acceptable is that of Type-Token Ratio (TTR) (Fairbanks, 1944; Johnson, 1944; Mann, 1944). This is the ratio of the number of different words (types) to the total number of words (tokens) in a given passage. While the TTR of the over-all sample of language is usually used as a measure of verbal variability, this ratio has also been applied to grammatical categories in written compositions (Chotlos, 1944).

A measure that has been used in attempts to describe the structure of language is that of frequency of use of individual grammatical categories (Templin, 1957). It is in this area of language that linguistic science has much to offer. Since traditional English grammar does not present an accurate description of language, the categories based upon the structure seem to be of more concern to students of verbal behavior. Traditionally, some parts of speech have been classified according to lexical meanings: for example, "a noun is the name of a person, place, or thing." Others are classified according to a function: that is, "an adjective modifies a noun or a pronoun;* and still others are classified according to formal characteristics: for example, "an 'ly' attached to the adjective form indicates an adverb" (Walsh and Walsh, 1957).

The linguists, on the other hand, categorize the elements of a sentence solely on the basis of structure and pattern. Fries (1952) divided English words into Classes I, II, III, and IV, using their distribution in sentences to establish categories. Words that could be substituted for "apple" in "The apple is good" were Class I words; for "is" were Class II words; and for "good" were Class III. Class IV words were those that told where, how, and when, as in "He walked home, slowly, later." A fifth category has words without meaning called function words, as "by," "but," "if," "the," "or," and so forth.

Though all of the measures mentioned in this section have been used by one or another investigator, it is difficult to synthesize them, as each study of language behavior tends to be unique in the type of language output elicited, in the particular measures used, in the stimuli employed, and in the age of the subject. Little study of the language of deaf children has been made, although much has been written about language teaching and the language needs of the hearing handicapped child.

Most of the investigators have found the language of the deaf subjects to be immature and retarded but few measures have been applied. By the measures which were used, however, the deaf pupils were found to use shorter and simpler sentences (Heider and Heider, 1940), more infinitives and prepositional phrases, fewer abstract nouns, relational words, and different verbs (Reay, 1948; Wells, 1940), and to make more errors of omission, substitution and addition of vocabulary than did hearing children (Myklebust, 1962).

Although many authors discussed the lack of flexibility or the amount of rigidity in the writing of the deaf subjects, no actual measure was applied to find the amount of rigidity. Nor has any attempt been made to compare the language of the deaf subjects to anything other than the written language of hearing children and the written language of hearing shown to be superior to their spoken language after the fifth grade (Lull, 1929). Only one investigator attempted

to measure the spoken language of a group of deaf children but the test resembled a memory test of their written product (Goda, 1959).

Separate and apart from the studies done with either a deaf or a hearing population, are the standardizations of tests on groups of hearing children. Unlike the many improved methods of appraising the educational achievement in school subjects such as arithmetic and reading, the objective diagnosis of language difficulties of normal children is restricted to technical factors, for example, use of abbreviations, punctuation, capitalization, spelling, and visual recognition of grammatical errors. Composition scales or opinions are still used to evaluate rhetorical and grammatical factors, for example, variety of sentences, beginnings and length, use of synonyms, use of active voice, punctuation, and so forth (Willing, 1926).

As interesting as the results of the available tests may be, they are lacking in that the subjective element plays an important and crucial role. To achieve objectivity, procedures of quantifying verbal output need to be applied to language samples.

In summary, while previous investigations and tests have pointed to and provided preliminary data on the measurement of language behavior, it is obvious that the current status of the field does not provide an integrated picture of the interrelations among various measures.

Furthermore, there is serious difficulty in attempting to relate previous work done in the area to the language behavior of the deaf since there is a paucity of data on an orally-educated deaf children.

Education of the Deaf

It might be well to describe relevant aspects of the education of the deaf at this point. While it is obvious that deaf children without training acquire no language, it is necessary when discussing children with this handicap to specify the type of education they receive. Children taught manually by finger spelling or in the environment of the language of signs, for example, may develop limited facility in written communication but have no use of the spoken form. Children, who have received an oral education are taught to say whatever they write. Instruction is based upon carefully selected items from the immediate environment and follows empirically defined stages set down by Gesell (1940) and McCarthy (1954) as the normal ontageny of language development in children.

Assuming the modality for receiving the instruction is visual, speechreading may be the tool for language perception for children. This substitute mode of communication, however, suffers from restrictions of light, distance, and direction. Furthermore, perceiving speech with the eye (speechreading) is complicated by the rapidity of speech movements, homophenity of certain phonemes (pan, pat, bat, bad, pad, man, mat, mad, ban) and the dissimilarity of

speakers' lip movements. The complexities of speech-reading or lipreading have been discussed by the present author elsewhere (Simmons, 1959), but despite its limitations, speechreading is the perceptual behavior required of orally-educated deaf children.

Through speechreading the deaf children are put to the task of developing facility in the use of language. Guidance is given them in associating linguistic symbols with referents, in building up an understanding of lexicon and structure, and in gaining control over language. It is often a slow and laborious process involving a great deal of repetition and drill. Since there is little insight at the moment into how the deaf child conceptualizes, the teachers of language need to use ingenious techniques to teach the concepts and their linguistic referents.

Some guidelines have been written which provide hope to the teacher. (Silverman, 1960)

1. Language teaching should be related to significant and meaningful experience of children.

2. Language should constantly be made to serve a purpose for the child.

3. All sensory channels should be used to teach language.

4. Teachers need to be alert to the ideas that are developing in children so that they may provide the children with language with which to express them.

5. Children need many varied contacts with the same language in order to make it theirs.

6. Many children need formal, systematic aids to the acquisition of language. Many shun language when they feel insecure in its use.

7. Schools and homes should create an atmosphere where language is used and books are read regularly (pp. 449-448)

Although textbooks and teaching materials of schools for the deaf are the same as those used in classrooms of hearing children, teachers of deaf children are concerned with problems never encountered by the teacher of hearing children. Unlike the teacher of hearing children the teacher of the deaf must concern herself with presentation of simple words such as "a", "an" and "the." She can, in fact, find articles in her professional journals given helpful ideas for teaching these determiners. She must be concerned with the presentation of the dependent clauses, of auxilary verbs, of pronouns, of prepositions, and of other vocabulary and structures which the hearing child has mastered as early as five years of age.

The teacher of the deaf has at her disposal methods of instruction which range from the very grammatical and analytical to the natural and synthetical. The basic feature of the grammatical approach is to get the child to analyze functional relations among discrete units of language and, by repetition and visual aids, to impart to the child an understanding of language principles, including how the arrangement of words affects the meaning of a

sentence. On the other hand, the teacher of the natural method supplies language to the child in situations where he has need for it. Practice is geared to actual natural situations. The drill periods are contrived situations that are purposeful and interesting to the child.

The orally-educated children in this study were educated by teachers using both grammatical and natural methods of instruction. The children, receiving the instruction through speechreading, learned to associate the visual symbols with their referents just as hearing children learned to associate auditory signals with their referents and to make responses in speech and in writing.

Present Study

This study is an investigation of a set of quantitative measures by which: 1) the growth of language with age can be observed; 2) deaf children who have been orally taught and hearing children can be compared; and 3) the development of spoken and written language can be contrasted. When language is described in relation to the variables of age, hearing and type of language, the measures could provide the basis for a test battery which could be administered easily and would reveal the actual language abilities of groups of children.

An analytical procedure of language description will include analysis of length of sentence, the count and percentages of words and word classes to indicate form and structure

in sentences, the subordination ratio to indicate the quality, and the TTR's of both total output and separate grammatical categories to show flexibility and diversity.

This study uses: 1) certain measures of language expression that have not been applied before to written and spoken output of deaf and hearing children, 2) a wide variety of language measures, which have not previously been tested on both types of expression from the same population, and 3) a ratio (TTR) which has not been applied to any sample of linguistic behavior of deaf children and only used to analyze the written work of hearing children. These syntactical, grammatical, and morphological measures should yield a sufficient number of aspects of linguistic behavior to permit adequate description of the language of deaf children.

CHAPTER II

PROBLEM

The present investigation has its origin in the need to describe and compare structural aspects of the language of children deprived of hearing with those who hear normally. In view of the ambiguous interpretations of investigators regarding language development of hearing children, the restricted number of studies of the written language of deaf children, and the absence of any analysis of the spoken output of these children, the need arises both to find tools suitable for determining levels of language ability, and to apply the tools to both forms of expression from both types of children.

The writer, during many years in the classroom, has observed that deaf individuals, when given oral instruction, exhibit some language abilities which closely approximate those of hearing children. Since teachers of the orally-taught-deaf children tend to follow empirically defined stages patterned after presumably normal developmental stages, the gross language ability can develop with a substitute receptive modality.

However, because these children are taught in a contrived environment in a brief period of the day, aspects of language which reflect control over flexibility and diversity, as well as syntactical detail do reflect auditory deprivation.

The restrictions of speechreading or visual perception are reflected in the deaf child's use of function words, which are a category of morphemes. Though small in actual number (154) the function words occur with great frequency (34 per cent) per 100 words in context (Fries, 1954). On inspection, it can be seen that these words are monosyllabic ("if", "an", "the", "but", "so", et cetera) and therefore immediately give the lipreader two problems. One is that of rapidity of speech giving little visual clue and the other is that the monosyllable may resemble two or three or more others, some of which may even have lexical meaning (that is, "by", "my", "pie", "buy").

The factor of definition introduces another handicap in the deaf child's acquisition of function words and that is the difficulty of experiencing their meaning. These are morphemes, which defy definition, ("if", "so") yet much of the deaf child's education has been learning the referent for the word he acquires (that is, "ball", "walk", "big", "slowly"). Some teachers do attempt to isolate function words and define them (that is, "and" means together; "in" means place; "a", "an", "the" means one, et cetera), but this explanation may very

well tend to detract from the proper syntax. So, it can be said that in the learning of the use of function words auditory reception is helpful.

While it has been demonstrated that the written language of hearing children is superior to their spoken output after age nine (Harrell, 1957), deaf children are taught to say whatever they can write and therefore they should not demonstrate a difference between the two forms of language output.

Furthermore, since the education of the deaf child is orally oriented, his spoken and written output should more closely resemble that of the spoken expression of hearing children.

Measures

The aspects, then, of language that need to be measured and compared in the two forms of expression from the two groups of children are those of 1) gross language ability, 2) flexibility of structure, 3) diversity in vocabulary, and 4) structural and syntactical detail.

Crucial to the measurement are the tools appropriate to the task. The measures that are proposed in this study were somewhat empirically selected on the basis of the studies cited in the first chapter and on the basis of the author's experience in the classroom.

Gross Language Ability

The measure most often used to gauge spoken language development of young hearing children and the written

language of older children is that of sentence length and it seems to be sensitive to growth. In fact, McCarthy (1954) writes: "no measure seems to have superseded the mean length of sentence for a reliable, easily determined, objective, quantitative and easily understood measure of linguistic maturity (p. 550)."

Implicit in this measure are, of course, two other counts, one of total number of words used in a given sample and the other, the total number of sentences in the same sample. The mean sentence length would be the result of the number of words divided by the number of sentences.

Flexibility of Structure

One measure of sentence quality which has been manipulated statistically is that of subordination. In fact, it has been described by one investigator as the best single criterion of maturity in expression (Smith, 1926). Furthermore, it can be freed from the vagaries of punctuation which beset sentence classification. Two investigators have used a ratio of subordination obtained by counting the verbs and determining the ratio of dependent to independent ones (Harrell, 1957; LaBrant, 1933). This indeed seems to be a reasonable measure of sentence flexibility and therefore will also be employed in this study.

Vocabulary Variability

It is readily apparent that flexibility in the use of words can be measured by finding the ratio of different

words to the total number of words. While this measure has only once been applied to a language sample of deaf children (Hardy, 1958) and has had little application to the linguistic output of hearing children (Chotlos, 1944; Templin, 1957), it seems to be the very best tool available to measure this important aspect of language. This, then would require the counting of the tokens (words) and the types (different words) and finding the ratio of one to the other, the Type-Token Ratio or TTR.

Structural and Syntactical Detail

While some authors measured this aspect of language by finding the frequency of use of individual grammatical categories (McCarthy, 1930; Templin, 1957) the present author proposes to measure the same aspect by using linguistic classifications which have the advantage of differentiating lexical from function classes and thereby pinpointing the syntax even more. Since lexical words are relatively concrete and are definable, they may be learned more readily than those words which have only the role of function in a sentence. The latter (function words) signal meaning and carry structural meaning it is true, but of themselves they are neither definable nor concrete. With this as a rationale, the investigator proposes to measure the use of words in lexical and function categories and to see whether the children have equal control of these two distinctly different classifications.

Hypotheses

This study proposes a comprehensive description of the differences between the spoken and written language in groups of hearing and orally-taught-deaf children. It will apply grammatical, lexical, and syntactical measures to samples of spoken and written language from the two populations in order to test the hypothesis that:

1. The spoken language ability of deaf children is the same as their written ability.

2. The written and spoken language ability of the deaf children is the same as the spoken language ability of hearing children.

3. The written language ability of the hearing children exceeds the written expression and the spoken expression of the deaf children.

4. Deaf children are less flexible in their language expression than hearing children.

5. Deaf children use more morphemes having lexical meaning than the hearing children.

6. Hearing children exceed the deaf children in their use of morphemes having structural meaning only.

The above hypotheses, when recast in terms of quantitative measures, lead to the hypotheses that:

1. The deaf children speak and write sentences of the same length.

2. a) The deaf children speak sentences of the same length as the hearing children speak.
   b) The deaf children write sentences of the same length as the hearing children speak.

3. a) The hearing children write longer sentences than the deaf children write.
   b) The hearing children write longer sentences than the deaf children speak.

4. The hearing children exceed the deaf on the measures of:

   a) ratio of subordination
   b) the type-token ratio

   These differences are predicted for both the written and spoken samples.

5. The deaf children use more words in each of the lexical categories than do the hearing children. This prediction, which holds for both writing and speaking, will be measured by the relative frequency of occurrence of Class I, II, III, and IV words. (See Appendix)

6. The hearing children exceed the deaf in the use of words in function categories as measured by the relative frequency of occurrence of Auxiliaries, Prepositions, Conjunctions, and Determiners. (See Appendix)

In light of the findings, teaching procedures may be changed or amplified. Techniques for testing and scaling language may evolve, and levels of language development be determined.

Since this study is a preliminary investigation of measures of language ability, the analysis will suggest the direction of subsequent work. This might be a refinement of the present measures, or the selection of one measure and the tracing of its development.

Certainly the use of such measures in the study of language of deaf children, in the analysis of pupil ability, and in the curriculum revision might be anticipated.

CHAPTER III

DESIGN

Subjects

Deaf Subjects

Since the study involved a comparison of hearing children with orally-taught deaf pupils, it was necessary to use the data from a school committed to oral education. Furthermore, the comparisons between spoken and written samples required children who could write as well as speak. Thirty-seven of the deaf pupils who had arrived at that level of competence at Central Institute for the Deaf were included.

The extent of deafness in all of these subjects was severe and for none of the subjects is there a record of speech and language having been developed prior to the onset of the hearing loss. Table I contains averaged data for the deaf subjects, with respect to hearing loss in the major speech frequencies of 500, 1,000, and 2,000 cycles per second and the intelligence quotient.

TABLE I

AGE, MEAN HEARING LOSS, MEAN IQ

FOR THE DEAF GROUPS

Age	Number	Mean H.L. in db (Average decibel loss in major speech frequencies)	SD	Mean IQ	SD
9 - 10	6	97.0	2.2	116.2	20.6
10 - 11	7	87.5	1.5	119.7	5.92
11 - 12	11	89.9	2.0	120.8	16.51
12 - 13	8	92.7	1.3	121.5	18.81
13 - 14	5	89.5	2.4	103.2	14.64

The intelligence quotient of each deaf child was based upon the Advanced Performance Scale obtained from the records of the school psychometrist. This particular measure, which has been shown to correlate with other measures having a large verbal component (White, 1939), was used because it is the best measure available for deaf children (Schick, 1934). Furthermore, it has been shown that amounts of hearing loss influence language development more than intelligence does (Brown and Merlin, 1961). Hearing, therefore, is the most important variable under consideration. In fact, it has been demonstrated with deaf subjects that a disparity exists between language quotient and intelligence quotients that does

not exist between the language quotients of high IQ and low IQ children (Brown and Merlin, 1961). It therefore appears that amounts of hearing loss influence language development more than increments of IQ.

Hearing Children

It should be recalled that the purpose of this study was to compare language output of two groups along the dimensions of lexical and structural units. These attributes of language appear to be more influenced by chronological age than by other extrinsic factors. While it is true that children who fall below a certain level possess insufficient language skill, intelligence and socio-economic level appear not to be as relevant to the particular skills to be studied here as does hearing. In fact, LaBrant (1933) found chronological age to be more closely related to language structure than mental age, and Harrell (1957) in investigating the relation of spoken to written expression concluded that "the subordination index in written and oral stories was more closely related to C.A. than M.A. (p. 41)."

Templin (1957) too was concerned with structure and reported that differences in the use of types of sentences were not great for different socio-economic status groups, but the use of subordination greatly increased over the five-year span studied. She also reported that when the child begins to use sentences there is considerable stability

in the proportion of the various parts of speech and this development is influenced more by age than by other factors.

Therefore, since this study is concerned with structural and lexical forms, the significant factors to consider in selecting subjects are hearing and chronological age. For the purposes of this study then, the subjects are children of average scio-economic environment and normal or above normal intelligence.

The data were obtained from hearing pupils in a public and a parochial school in an average or above average socio-economic suburban neighborhood in the metropolitan area.[1]

In number, the 100 subjects with normal hearing were equally divided as to sex for ages nine through thirteen. Table II contains the age and intelligence scores of the hearing group.

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[1]Appreciation is expressed to the principals and their staffs at the McKnight Elementary and St. Stanislaus Schools for their cooperation and assistance.

TABLE II

AGE AND MEAN IQ FOR THE HEARING GROUPS

Age	Number	Mean IQ	SD
9 - 10	20	121.5	14.95
10 - 11	20	118.65	14.38
11 - 12	20	119.15	12.95
12 - 13	20	121.60	13.48
13 - 14	20	118.25	14.93

The Data

Method of Obtaining the Language Samples

Many of the previous investigations have recorded spontaneous responses of children (McCarthy, 1930; Templin, 1957). Others have stimulated responses by proposing a statement which required argumentation or discussion (LaBrant, 1933), and still others have prompted free expression by showing a movie (Harrell, 1957; Heider and Heider, 1940) while a few have used still pictures (Goda, 1959; Myklebust, 1960).

In obtaining the samples of linguistic behavior for this study, careful consideration was given to several factors: 1) the complexity of the stimulus material; 2) the interest of the stimuli; 3) the constancy of the content; 4) the ready availability of the stimuli for use

with individuals or groups; and 5) their practicability for use by untrained personnel and the ease of interpretation of the responses by untrained people. Furthermore, since syntax is influenced by the type of stimulus used (Seegers, 1943) and since investigations with the deaf with which these data might be compared had utilized narration (Heider and Heider, 1940; Myklebust, 1960), it was necessary that the stimuli elicit narrative responses.

A preliminary investigation revealed some materials that satisfied the above criteria. It was found that a picture story consisting of four frames was satisfactory. The picture stories used to stimulate written language were: 1) children seeing a soda fountain are prompted to set up a lemonade stand to earn money to buy a soda; 2) a child visiting a farm falls into a pond and is rescued by the farmer; 3) some children fishing, while a turtle nibbles at their string of fish suspended in the water; 4) children playing toss whose ball rolls under the house and is fetched by a dog; 5) a girl hunting her shoe which had been hidden by her dog. (See Appendix)

The picture used to stimulate speech had to do with children who, when playing baseball, break a window with a batted ball. (See Appendix)

Each picture story of four frames was reproduced by "Ditto" process on an eight by eleven inch paper, thereby

providing a copy for each subject's individual use.[2]

No effort was made to control the order of presentation of pictures, nor was there any control over the time required by the child to give either a written or a spoken response.

The classroom teachers assisted in collecting the samples of written language. These teachers were informed that specimens of the children's language were desired and that the pupils should be motivated to do their best. The teachers were further instructed that no corrections were to be made and that no assistance of any kind was to be given. The compositions were written at the convenience of the child and the teacher, but no more than one story per day was written. No time limit was set nor any pressures applied. No attempt was made to provoke an unusually large number of words from each child.

The same instruction of, "Tell me a story about the picture," was used when obtaining the spoken samples. In most instances the recorder spent three or four minutes establishing rapport before showing the sequence. The recorder of the spoken sample for the hearing children was a teacher from the school system with whom the children were

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[2]Appreciation is expressed to Dr. Richard Brill, Superintendent, California School for the Deaf, Riverside, California, for permission to duplicate the pictures.

familiar,[3] while for the deaf children it was the investigator. All of the recording was done on a tape recorder in a room apart from the classroom, and only one child at a time came in for the recording session. In the case of the deaf children, the investigator immediately transferred to writing the story recorded by the child and showed him the written version for his approval, as this was in no way to be a test of the intelligibility of the speech of the hearing handicapped. The speech of the hearing children was transcribed by two listeners who checked each other for accuracy.

Each of the compositions, 500 written and 100 spoken ones from the hearing children, and 185 written and 37 spoken ones from the deaf children was typed on a separate piece of paper so that all were equally legible. No corrections or changes were made in the language used by the child.

Each subject was assigned a number selected at random and this number was used instead of the subject's name on all papers and tabulations.

Method of Scoring

All of the data, 685 written and 137 spoken compositions, were scored by a team of five people who were students in the English department of the University.

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[3]Appreciation is expressed to Miss Jeane Stern, itinerant hearing therapist, St. Louis County Special Education on School-District, for many hours of her time and her excellent cooperation.

The team was trained in a program consisting of instruction by the experimenter, followed by a work period at which individual compositions were analyzed by each member of the team. When the team met the criterion of complete agreement in tabulations on individually scored compositions, the training was considered adequate and was terminated. While the experimenter is sensitive to inter-scorer reliability required when inference is involved, she felt that the task here was at a very low inference level. It simply involved counting words and sentences. In fact, the greatest inference required was that of determining the presence of subordination. The agreement among scores on this aspect was high from the outset. When the analysis of the test papers was begun, each composition was scored by one member of the team, rechecked by another, and totaled by a third member.

Intrinsic in the design of the battery of measures was a crosscheck, that is, the total tokens had to equal the total number of tokens in each of the grammatical categories. This was also true of the types. Furthermore, the total number of sentences equalled the sum of those classified as to kind, and the total number of words in the sentences equalled the total number of tokens over-all.

Measures Used

The development of gross language ability was traced by counting: a) the total number of tokens, b) the total number of sentences; and c) the length of sentences.

Flexibility of sentence structure was measured by the ratio of subordination.

The measure of vocabulary variability was that of: a) over-all type-token ratio (TTR), which is the proportion of different words (types) to the total number of words (tokens); and b) the TTR in grammatical categories.

The syntactical or structural detail was measured by the relative frequency of use of words in lexical and function classes.

Graphic Presentation of Data

It was readily apparent that representation of data of two types of children at five age levels for five sets of written compositions would be cumbersome. Therefore it seemed advisible to average the five written compositions, provided they could be considered equivalent.

The means of the total words written for each age level and for the two types of subjects were tested by analysis of variance (Edwards, 1951). The analysis yielded no effects among the words in the compositions for the five pictures written by the hearing children, although the individual differences among the children were significantly different. The latter difference was to be expected (Table III and Table IV). Since the comparisons were to be made of the written output and since there was no difference among pictures, it seemed advisable to average the five written compositions to find the written score. It is this average that appears in the graphic presentation of data.

TABLE III

SUMMARY TABLE OF ANALYSIS OF VARIANCE OF TOTAL NUMBER OF WORDS USED IN RESPONSE TO FIVE SETS OF PICTURES FROM HEARING CHILDREN

Age 9

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	1902.64	475.66	2.407	
Among Subjects	19	51324.59	2711.29	14.0964	.05
Interaction	76	14564.56	191.63		
Total	99	67791.79			

Age 10

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	1544.9	376.25	1.786	
Among Subjects	19	195350.56	1028.16	4.755	.05
Interaction	76	16433.10	216.23		
Total	99				

Age 11

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	2471.94	617.985	1.222	
Among Subjects	19	110650.44	5823.707	11.5181	.05
Interaction	76	38426.05	505.605		
Total	99				

Age 12

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	1561.90	390.475	1.585	
Among Subjects	19	27853.15	1465.955	5.95	.05
Interaction	76	18721.70	246.338		
Total	99				

Age 13

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	5747.86	1436.965	1.911	
Among Subjects	17	185220.51	10895.324	14.493	.05
Interaction	76	57133.34	751.755		
Total	99				

TABLE IV

SUMMARY TABLE OF ANALYSIS OF VARIANCE OF TOTAL NUMBER OF WORDS USED IN RESPONSE TO FIVE SETS OF PICTURES FROM DEAF SUBJECTS

Age 9

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	57.77	14.445	.251	
Among Subjects	5	3358.27	671.654	11.687	.01
Interaction	20	1149.43	57.472		
Total	29				

Age 10

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	7750.00	1937.5	2.38	
Among Subjects	6	31420.34	5236.72	6.45	.01
Interaction	24	18692.7	812.2		
Total	34				

Age 11

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	732.292	183.073	.718	
Among Subjects	10	45517.782	4551.778	17.858	.01
Interaction	40	10195.308	254.882		
Total	54				

Age 12

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	3018.65	754.66	3.195	
Among Subjects	7	20691.78	2955.97	12.815	.01
Interaction	28	6613.35	236.19		
Total	39				

Age 13

Source	df	Sums of Squares	Mean Squares	F	P
Between Pictures	4	710.96	177.74	.8017	
Among Subjects	4	1734.16	433.54	1.95539	
Interaction	16	3547.44	221.715		
Total	24				

Analysis

The data for the total number of words and the total number of sentences were examined graphically. The specific statistical analysis was the Lindquist Type 1 analysis (Lindquist, 1956) in which the data was sentence lengths of two form of expression from two types of children. Sentence length is the total number of words divided by the total number of sentences. The analysis was made to determine whether a difference in sentence length existed (1) between deaf and hearing subjects, and (2) between written form as opposed to spoken sample and to see if either differences were dependent upon the other.

Separate analyses were made for each age level since interpretation of developmental trends was of interest to the investigator.

The second phase of the study was designed to furnish information to be used as a basis for deciding whether or not to accept the hypotheses that deaf children have less flexibility in their language structure than do hearing children. The statistical analysis, which was done on the ratio of subordination, was a test of the significance of the difference between means and an analysis of variance.

The third phase of the study was to give a basis for deciding whether the deaf children had less flexibility (or variability) in their vocabulary as predicted in hypothesis four. A test of the significance of the difference between means and an analysis of varience were applied to the type-token

ratio (TTR) scores. The TTR of the lexical and structural categories were examined graphically.

In the fourth phase of the study the data were further analyzed to show the relative frequency of occurrence within lexical and structural categories of the four major conditions of the experiment. These data were used to decide the result of hypotheses five and six as stated in Chapter II.

CHAPTER IV

RESULTS

As indicated in Chapter II, this study proposes a comparison of the spoken and written language of deaf and hearing children. The present chapter attempts to treat each hypothesis individually and to describe the statistics employed.

Hypothesis One

The first hypothesis was that the spoken language ability of deaf children was the same as their written ability. Operationally stated, deaf children would speak and write sentences of the same length. The mean sentence length was determined by dividing the total number of words by the total number of sentences.

The mean lengths of sentences for both forms of expression by deaf and hearing children at five age levels are presented visually in Figure I. These data, along with the "t" tests for correlated means (Lindquist, 1956; P. 272) are presented in Table V. At no age level was there a significant difference between the two forms of expression. Thus the hypothesis stating that deaf children would write and speak sentences of the same length was confirmed.

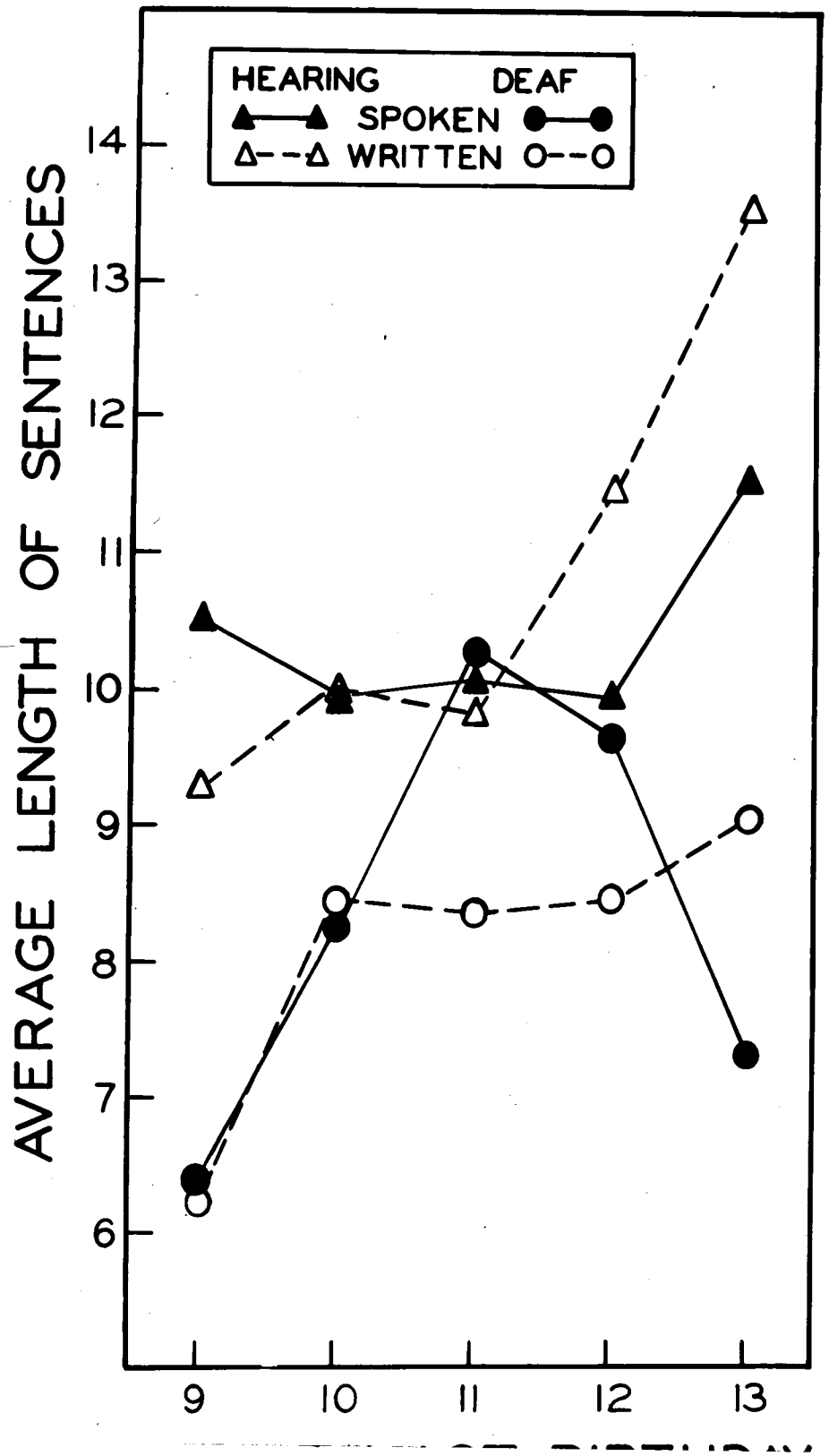


FIGURE I

AVERAGE LENGTH OF SENTENCES SPOKEN AND WRITTEN BY DEAF AND HEARING CHILDREN AT FIVE AGE LEVELS

TABLE V

TEST OF THE SIGNIFICANCE OF DIFFERENCES BETWEEN THE MEAN SENTENCE LENGTH OF SPOKEN AND WRITTEN LANGUAGE OF DEAF CHILDREN

Age	N.	Spoken		Written				
		M	SD	M	SD	Md	t	p
9	6	6.39	.698	6.22	.463	.169	.1093	
10	7	8.23	2.312	8.414	.675	.184	.6696	
11	11	10.27	3.637	8.36	1.610	1.91	2.129	
12	8	9.65	2.281	8.44	1.433	1.21	1.318	
13	5	7.31	1.726	9.04	1.711	1.73	1.389	

Hypothesis Two

The second hypothesis stated that the written and spoken ability of the deaf children was the same as the spoken language ability of hearing children. Recast in quantitative terms, it led to two operational hypotheses: one, that deaf children would speak sentences of the same length the hearing children and two, that the deaf children would write sentences of the same length the hearing children speak.

Examination of Table VI indicates a significant difference between the mean sentence length spoken by the deaf subjects and that spoken by the hearing subjects at three age levels: nine, ten, and thirteen. For those three age levels the hypothesis had to be rejected. However, for ages eleven and twelve, the data supported the hypothesis, which is that the deaf children would speak sentences of the same length as hearing children would speak.

In order to analyze the data to test the second portion of the second hypothesis, Table VII was made. It gives the mean scores and the findings of the "t"-test for the written sentence length of the deaf children and the spoken sentence length of the hearing subjects. At all levels the differences between the deaf and the hearing groups were significant. Accordingly, the portion of the hypothesis which stated that deaf children would write sentences of the same length as hearing children would speak was rejected.

Hypothesis Three

The hypothesis which stated that the written language ability of the hearing subjects would exceed the written and the spoken expression of the deaf children was the third one to be examined.

An analysis of the data was made to determine whether any differences exist (1) between the sentence length of the written output of deaf and hearing children, and (2) between the sentence length of the written output of hearing children

TABLE VI

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEAN SENTENCE LENGTH SPOKEN BY DEAF AND HEARING CHILDREN

Age	Deaf			Hearing					
	Number	M	SD	Number	M	SD	Md	t	p
9	6	6.39	.70	20	10.512	3.65	4.12	5.84	.01
10	7	8.23	2.31	20	9.908	3.48	1.67	2.52	.02
11	11	10.26	3.64	20	10.03	2.78	0.23	0.28	
12	8	9.65	2.28	20	9.95	2.37	0.3	0.43	
13	5	7.31	1.73	20	11.51	3.20	4.2	3.41	.01

TABLE VII

TEST OF THE SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF SENTENCE LENGTH WRITTEN BY DEAF AND SPOKEN BY HEARING SUBJECTS

Age	Number	Deaf-Written		Number	Hearing-Spoken				
		M	SD		M	SD	Md	t	p
9	6	6.22	.46	20	10.51	3.65	4.29	6.1	.01
10	7	8.41	.68	20	9.91	3.48	1.5	2.26	.05
11	11	8.36	1.61	20	10.03	2.79	1.67	2.06	.05
12	8	8.44	1.43	20	9.95	2.37	1.51	2.13	.05
13	5	9.04	1.71	20	11.51	3.20	2.47	2.09	.05

and the sentence length of the spoken expression of deaf children.

Table VIII gives the mean scores for the two groups in the written form. For ages nine, ten, twelve, and thirteen the differences between the groups were significant. Therefore, for these age levels the portion of the hypothesis which stated that the written expression of the hearing subjects would exceed the deaf could be accepted, but at age eleven it must be rejected.

As revealed in Table IX, the differences between the means of the written sentence length of the hearing children and the spoken sentence length of the deaf children were significant at all ages except eleven. Hence, the hypothesis that the written language ability of hearing subjects would exceed the speaking ability of the deaf subjects could be accepted, save for age eleven. It is to be remembered that that age was the only one at which the spoken and written language of the deaf were significantly different (Table V).

Hypothesis Four

The next phase of the experiment sought the confirmation or rejection of hypothesis four, which was that deaf children would use less flexibility in their language expression than hearing children would. Two quantitative measures--subordination ratio and type-token ratio--were used to investigate the differences. The former is a syntactical measure found

TABLE VIII

TEST OF THE SIGNIFICANCE OF DIFFERENCE OF THE MEANS OF WRITTEN SENTENCE LENGTHS OF DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	6.2	.463	20	9.28	1.59	8.41	10.003	.01
10	7	8.414	.675	20	10.003	1.78	1.59	2.401	.05
11	11	8.36	1.610	20	9.84	1.84	1.48	1.595	
12	8	8.44	1.433	20	11.47	1.65	3.03	4.321	.01
13	5	9.04	1.711	20	13.55	3.34	5.41	4.393	.01

TABLE IX

TEST OF THE SIGNIFICANCE OF DIFFERENCE OF THE MEANS OF WRITTEN SENTENCE LENGTHS OF HEARING CHILDREN AND SPOKEN SENTENCE LENGTHS OF DEAF CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	6.39	.698	20	9.275	1.589	2.885	4.12	.01
10	7	8.23	2.312	20	10.003	1.784	1.773	2.67	.02
11	11	10.26	3.637	20	9.84	1.836	1.42	1.75	
12	8	9.65	2.281	20	11.47	1.647	1.82	2.59	.05
13	5	7.31	1.726	20	13.55	3.341	6.24	5.07	.01

by dividing the number of independent verbs by the number of dependent ones. The type-token ratio (TTR) is the measure of verbal diversity found by dividing the number of different words (types) by the total number of words (tokens).

Subordination Ratio

The mean subordination ratio scores for the two groups in both forms of expression are presented in Tables X and XI. These results are illustrated in graphical form in Figure II. The analysis of variance for the subordination ratio, presented in Table XII, indicates that a level of significance was reached for groups only at thirteen years of age, and for forms at nine, eleven, and thirteen. The only level at which the interaction of forms by groups was significant was at twelve years. As far as could be determined from the examination of the data, the between subject variance was the same whether the subjects were deaf or hearing, or the form, spoken or written. Furthermore, the use of the Hartley test (Walker and Lev, 1953) gave unambiguous results indicating that the variance was not hetergeneous. Therefore no test of homogenity of variance was used. On this subject Lindquist (1956) writes that:

> Unless the departure from normality is so extreme that it can be easily detereted by mere inspection of the data, the departure from normality will probably have no appreciable effect on the validity of the F-test, and the probabilities read from the F-table may be used as close approximations to the true probabilities ---- while statistical tests of heterogenity of variance are available, there will be

> relatively few situations in which any such test is required ---- unless the hetergenity of either form or variance is so extreme as to be readily apparent upon inspection of the data, the effect upon the F-distribution will probably be negligible (p. 86).

When the significance of the difference between the means of the two forms of the subordination ratio by the hearing group was tested using the t-test for correlated means (Lindquist, 1956, p. 271 and 165), the hearing children at the three older levels of eleven, twelve, and thirteen years wrote with a significantly higher subordination ratio than they spoke (Table X). The deaf children, on the other hand showed no difference at any level between the forms (Table XI).

While the measure of subordination ratio did differentiate types of output significantly at three of the age levels, it did not support the hypothesis that the hearing have greater language flexibility than the deaf at any but the oldest age level tested--thirteen years.

TABLE X

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS OF THE SUBORDINATION RATIO WRITTEN AND SPOKEN BY HEARING CHILDREN

Age	Number	Spoken		Written				
		M	SD	M	SD	Md	t	p
9	20	.162	.14	.121	.08	.041	1.289	
10	20	.264	.199	.232	.20	.032	.618	
11	20	.148	.138	.192	.106	.044	14.67	.01
12	20	.093	.089	.215	.101	.222	2.56	.02
13	20	.292	.227	.35	.174	.059	4.179	.01

TABLE XI

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS OF THE SUBORDINATION RATIO WRITTEN AND SPOKEN BY DEAF CHILDREN

Age	Number	Spoken		Written				
		M	SD	M	SD	Md	t	p
9	6	.158	.12	.052	.06	.104	1.79	
10	7	.176	.08	.246	.092	.07	.8	
11	11	.104	.095	.106	.066	.002	.5	
12	8	.166	.128	.128	.055	.039	.285	
13	5	.068	.073	.08	.062	.012	.045	

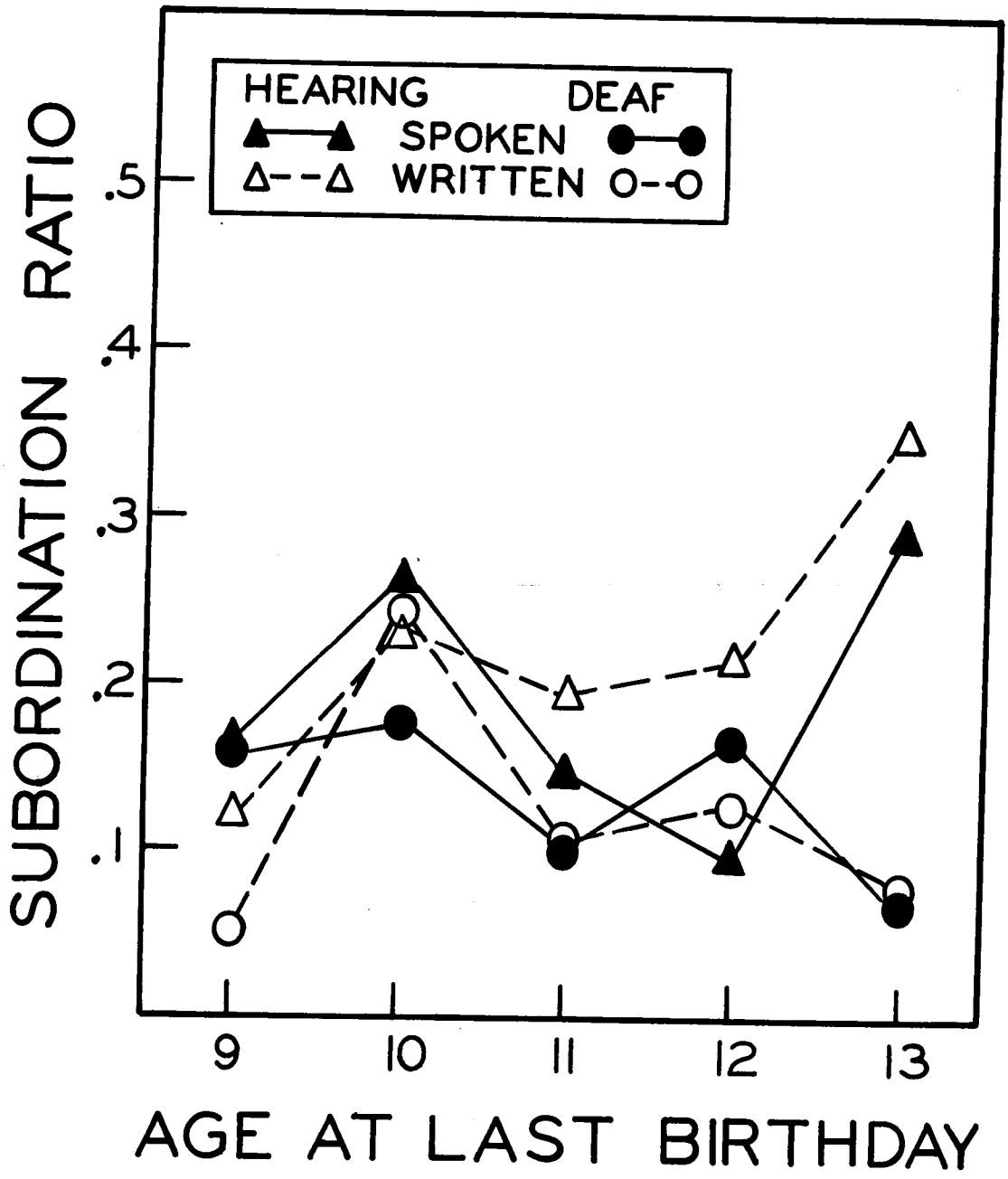


Figure II

THE SUBORDINATION RATIO OF WRITTEN AND SPOKEN LANGUAGE SAMPLES OF DEAF AND HEARING SUBJECTS AT FIVE AGE LEVELS

TABLE XII

SUMMARY TABLE OF THE ANALYSIS OF VARIANCE OF THE SUBORDINATION RATIO OF WRITTEN AND SPOKEN LANGUAGE FROM TWO GROUPS OF CHILDREN

Age 9

Source	SS	df	M_s	F	p
Between Subjects	.4408	25	.0176		
Groups	.0121	1	.0121	.6797	
Error (g)	.4287	24	.01788		
Within Subjects	.2725	26	.0105		
Forms of Exp.	.0404	1	.0404	4.365	.05
G x F	.0101	1	.0101	1.1098	
Error (w)	.22	24	.0091		
Total		102			

10 - 11 Yr.

Source	SS	df	M_s	F	p
Between Subjects	.7067	26	.0271		
Groups	.0146	1	.0146	.52898	
Error (g)	.6921	25	.0276		
Within Subjects	.4279	27	.0158		
Forms of Exp.	.008	1	.0008	.0485	
G x F	.0268	1	.0268	1.674	
Error (w)	.4003	25	.01601		
Total		106			

TABLE XII (Con't.)

Source	SS	df	M_s	F	p
		11 - 12 Yr.			
Between Subjects	.6117	30	.2039		
Groups	.0275	1	.0275	1.3681	
Error (g)	.5842	29	.0201		
Within Subjects	.2020	31			
Forms of Exp.	.0298	1	.0298	5.05	.05
G x F	.0001	1	.0001	.017	
Error (w)	.1721	29	.0059		
Total		122			
		12 - 13 Yr.			
Between Subjects	.3682	27	.0136		
Groups	.0005	1	.0005	.0358	
Error (g)	.3677	26	.0141		
Within Subjects	.3077	28	.0109		
Forms of Exp.	.0810	1	.0810	13.73	.01
G x F	.0738	1	.0738	12.509	.01
Error (w)	.1529	26	.0059		
Total		110			

TABLE XII (Con't.)

Source	SS	df	M_S	F	p
		13 - 14 Yr.			
Between Subjects	1.0992	24	.0458		
Groups	.4866	1	.4866	18.3622	.01
Error (g)	.6096	23	.0265		
Within Subjects	1.1031	25	.0441		
Forms of Exp.	.0303	1	.0303	.6502	
G x F	.0018	1	.0018	.039	
Error (w)	.5832	23	.0466		
Total		128			

TABLE XIII

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS OF THE SUBORDINATION RATIO WRITTEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	.052	.06	20	.121	.08	.069	.658	
10	7	.246	.092	20	.232	1.997	.014	.2712	
11	11	.106	.066	20	.192	.138	.086	2.283	.05
12	8	.128	.055	20	.215	.101	.088	2.492	.02
13	5	.08	.062	20	.35	.174	.27	4.692	.01

TABLE XIV

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS OF THE SUBORDINATION RATIO SPOKEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	.156	.12	20	.162	.14	.004	.038	
10	7	.176	.08	20	.264	.199	.088	1.705	
11	11	.1036	.095	20	.148	.138	.044	1.167	
12	8	.1663	.128	20	.095	.09	.07	2.087	.05
13	5	.068	.073	20	.292	.227	.224	3.88	.01

Type-token Ratio

In order to find the amount of verbal diversity in words used by the two groups of children the type-token ratio was found. The mean values are graphically presented in Figure III and reported in Table XV.

Differences between the forms and groups were investigated by means of the analysis of variance technique and summarized in Table XVI. The evidence gathered from the application of that technique to the variables of type of expression and groups of children reveals the difference between the groups to be significant at all ages except twelve years. The differences between the groups are, in fact, true differences at the .01 level of confidence.

The differences between the forms, however, were not significant at any but the ten-year level. A .05 level of significance was reached for the forms by groups (FxG) interaction at only one age level, which was eleven years.

Except for the twelve-year-olds, the data for the type-token ratios were generally supportive of the hypothesis that hearing children exceed the deaf in verbal flexibility.

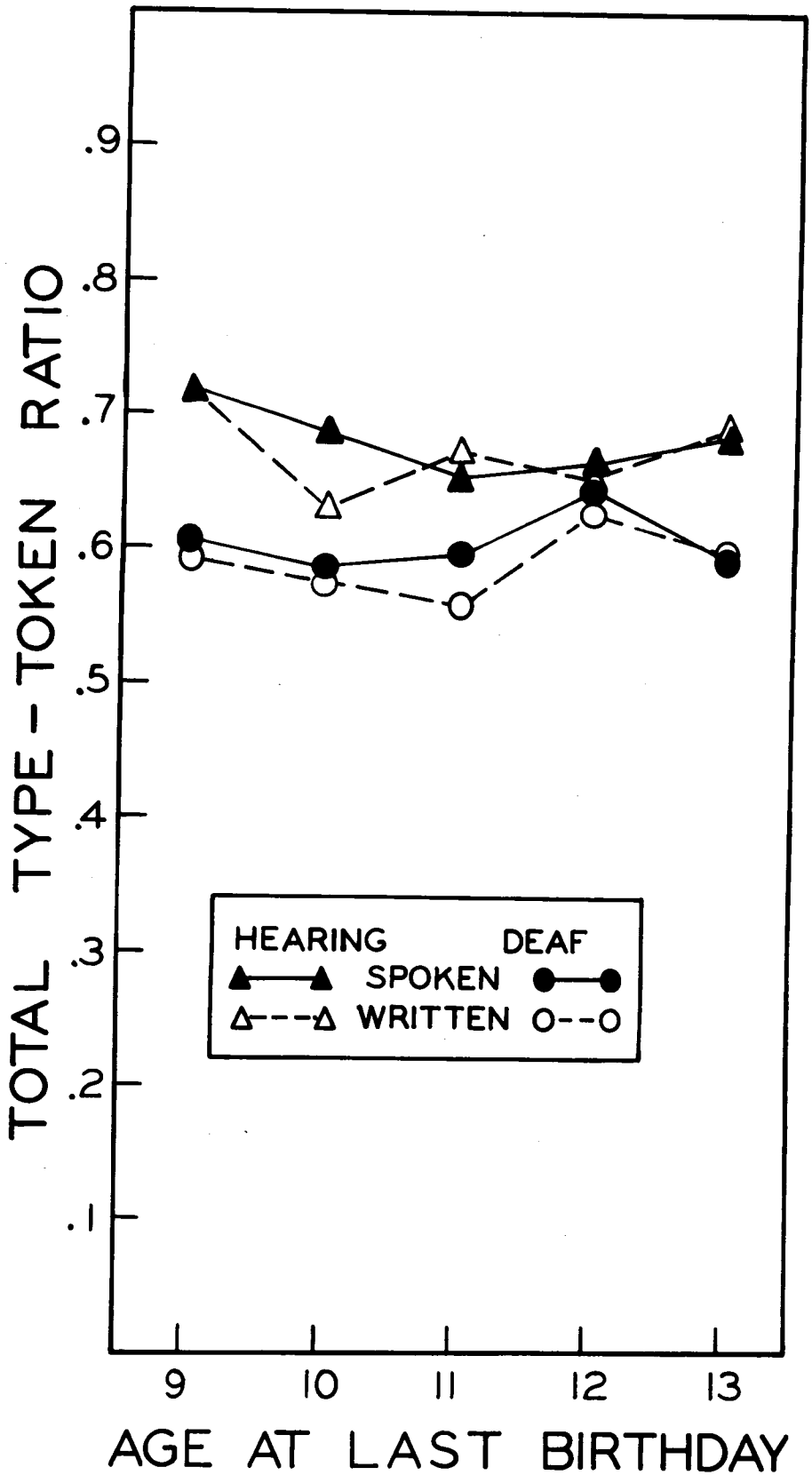


Figure III

THE TYPE-TOKEN RATIO OF SPOKEN AND WRITTEN LANGUAGE SAMPLES OF DEAF AND HEARING SUBJECTS AT FIVE AGE LEVELS

TABLE XV

MEANS OF THE TYPE-TOKEN RATIO WRITTEN AND SPOKEN BY THE TWO GROUPS OF CHILDREN

Age	Number	Deaf				Number	Hearing			
		Spoken		Written			Spoken		Written	
		M	SD	M	SD		M	SD	M	SD
9	6	.607	.08	.59	.015	20	.717	.087	.717	.061
10	7	.586	.075	.573	.038	20	.689	.073	.629	.088
11	11	.597	.056	.557	.042	20	.653	.073	.671	.061
12	8	.643	.076	.629	.062	20	.665	.068	.652	.042
13	5	.590	.109	.592	.029	20	.683	.09	.689	.049

TABLE XVI

SUMMARY TABLE OF THE ANALYSIS OF VARIANCE OF TYPE-TOKEN RATIO OF WRITTEN AND SPOKEN LANGUAGE FROM TWO GROUPS OF CHILDREN

Age 9

Source	SS	df	M_s	F	p
Between Subjects	.2484	25	.0099		
Groups	.1288	1	.1288	26.2857	.01
Error (g)	.1196	24	.0049		
Within Subjects	.1444	26	.0055		
Forms	.0002	1	.0002	.033	
G x F	.0006	1	.0006	.1017	
Error (w)	.1436	24	.0059		
Total		102			

Age 10

Source	SS	df	M_s	F	p
Between Subjects	.4137	26	.0159		
Groups	.0655	1	.0655	11.2931	.01
Error (g)	.1471	25	.0058		
Within Subjects	.2011	27	.0074		
Forms	.0304	1	.0304	5.152	.05
G x F	.0055	1	.0055	.833	
Error (w)	.1652	25	.0066		
Total		106			

TABLE XVI (Continued)

Source	SS	df	M_s	F	p
		Age 11			
Between Subjects	.2677	30	.008921		
Groups	.1013	1	.10129	17.658	.01
Error (g)	.1664	29	.005736		
Within Subjects	.0800	31	.002582		
Forms	.00008	1	.00008	.03425	
G x F	.01218	1	.01218	5.214	.05
Error (w)	.06774	29	.002336		
Total		122			
		Age 12			
Between Subjects	.1447	27	.0054		
Groups	.0059	1	.0059	1.1132	
Error (g)	.1388	26	.0053		
Within Subjects	.0684	28	.0024		
Forms	.0023	1	.0023	.92	
G x F	.0	1	.0	.0	
Error	.0061	26	.0025		
Total		110			

TABLE XVI (Continued)

Source	SS	df	M_s	F	p
		Age 13			
Between Subjects	.2494	24	.0103		
Groups	.0717	1	.0717	9.312	.01
Error (g)	.1777	23	.0077		
Within Subjects	.0955	25	.0038		
Forms	.0003	1	.0003	.0731	
G x F	.0007	1	.0007	.1707	
Error (w)	.0945	23	.0041		
Total		128			

Hypothesis Five

The fifth hypothesis predicted that the deaf children would use more morphemes having lexical meaning than the hearing children would. To check this prediction, the frequency of use of words in lexical word categories were tabulated. The linguistic classifications of Fries (1952) and Roberts (1958) were applied to the language samples. (See Appendix). The percentages were calculated for each category relative to the total number of words used in each particular story. The relative frequency of occurrence of the lexical categories Class I through Class IV (See Appendix) are presented graphically in Figure IV and the Means and Standard Deviations of these data are shown in tabular form in Tables XVII through XXIV.

The test of the significance of difference between the percentage of words in each category for both forms by the two groups was considered the appropriate test for this hypothesis. The results of this analysis also appear in Tables XVII through XXIV.

Only for three of the Classes of lexical words were there significant differences between the written expression of the deaf and hearing groups and these differences were only at certain age levels. As can be seen in Table XVI, the deaf wrote significantly more Class I words at ages twelve and thirteen than did the hearing at the same age level.

Table XXIV shows that they wrote fewer Class IV words at ages ten and thirteen. In Table XXIII, it can be seen that they spoke significantly fewer Class IV words at age ten than did the hearing, and in Table XXIV, it is shown that the deaf children wrote significantly fewer Class IV words at ages ten and thirteen.

In general, the data did not support the hypothesis that the deaf use more morphemes having lexical meaning than did the hearing children.

Hypothesis Six

Lastly, it was hypothesized that hearing children would exceed the deaf children in their use of morphemes having only structural meaning. Operationally, the hearing children would exceed the deaf in their use of words in function or structure categories as measured by the relative frequence of occurrence of Auxiliaries, Prepositions, Conjunctions, and Determiners. (See Appendix).

The words were classified and the relative frequence of usage determined. These findings are visually presented in Figure IV. The mean of the percentages of the words in each classification, the Standard Deviation, and the "t"-scores appear in Tables XXV through XXXII.

TABLE XVII

TEST OF THE SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEANS OF THE PERCENTAGES OF CLASS I TOKENS SPOKEN BY DEAF AND HEARING

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	32.0	2.93	20	31.95	4.14	.05	.029	
10	7	35.29	2.71	20	32.25	2.89	3.04	1.807	
11	11	34.0	3.75	20	31.75	5.34	2.25	1.226	
12	8	34.63	3.39	20	32.5	3.37	2.13	1.498	
13	5	33.6	3.2	20	29.95	2.58	3.65	1.796	

TABLE XVIII

TEST OF THE SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEANS OF THE PERCENTAGES OF CLASS I TOKENS WRITTEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	37.6	4.07	20	35.04	5.17	2.56	1.125	
10	7	37.13	4.22	20	33.75	4.62	3.38	1.63	
11	11	36.64	2.81	20	35.07	3.53	1.57	1.256	
12	8	37.93	3.35	20	32.08	3.22	5.15	3.754	.01
13	5	35.92	3.41	20	30.98	3.17	4.94	3.059	.01

TABLE XIX

TEST OF THE SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEANS OF THE PERCENTAGES OF CLASS II TOKENS SPOKEN BY THE DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	18.33	2.9	20	18.35	3.41	.02	.013	
10	7	19.0	1.5	20	17.35	1.77	1.65	1.908	
11	11	18.45	2.67	20	16.8	2.01	1.65	1.93	
12	8	18.5	1.9	20	16.4	2.72	2.1	1.99	
13	5	19.2	2.72	20	17.45	3.54	1.75	1.02	

TABLE XX

TEST OF THE SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEANS OF THE PERCENTAGES OF CLASS II TOKENS WRITTEN BY DEAF AND HEARING CHILDREN

Age	Deaf			Hearing					
	Number	M	SD	Number	M	SD	Md	t	p
9	6	17.77	1.53	20	16.98	2.52	.79	.739	
10	7	18.11	2.19	20	17.18	2.41	.83	.796	
11	11	17.60	2.08	20	17.32	2.29	.28	.333	
12	8	18.08	1.92	20	15.46	2.68	3.62	3.45	.01
13	5	18.68	1.79	20	14.21	1.79	4.47	4.97	.01

TABLE XXI

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE OF THE MEANS OF THE PERCENTAGES OF CLASS III TOKENS SPOKEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	1.0	1.42	20	.55	1.07	.45	.85	
10	7	1.0	1.42	20	2.75	2.12	1.75	2.009	
11	11	1.0	1.48	20	1.2	1.21	.02	.230	
12	8	1.13	1.76	20	.9	1.51	.23	.344	
13	5	1.6	1.2	20	1.4	1.68	.20	.248	

TABLE XXII

TEST OF THE SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEANS OF THE PERCENTAGES OF CLASS III TOKENS WRITTEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	1.26	1.16	20	1.09	1.28	.17	.295	
10	7	2.66	1.64	20	2.07	2.38	.59	.6000	
11	11	2.04	1.29	20	1.37	1.54	.67	1.214	
12	8	1.45	1.05	20	1.52	2.19	.07	.076	
13	5	1.32	1.17	20	2.72	2.57	1.4	1.168	

TABLE XXIII

TEST OF THE SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEANS OF THE PERCENTAGES OF CLASS IV TOKENS SPOKEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	3.67	3.86	20	5.2	2.6	1.53	1.15	
10	7	2.14	1.25	20	5.05	2.91	2.91	2.53	.02
11	11	3.73	1.96	20	4.7	2.9	0.97	.981	
12	8	3.63	2.23	20	4.83	2.37	1.22	1.612	
13	5	4.0	1.55	20	6.13	2.87	2.15	1.594	

TABLE XXIV

TEST OF THE SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEANS OF THE PERCENTAGES OF CLASS IV TOKENS WRITTEN BY DEAF AND HEARING CHILDREN

Age	Deaf			Hearing				
	Number	M	SD	Number	M	SD	Md	t	p
9	6	2.59	1.89	20	5.58	3.87	2.99	1.88	
10	7	2.86	1.64	20	5.91	2.43	3.05	3.044	.01
11	11	2.95	1.72	20	4.76	2.95	1.81	1.847	
12	8	2.83	1.87	20	4.36	2.99	1.53	1.33	
13	5	2.24	1.41	20	5.6	2.95	3.36	2.437	.05

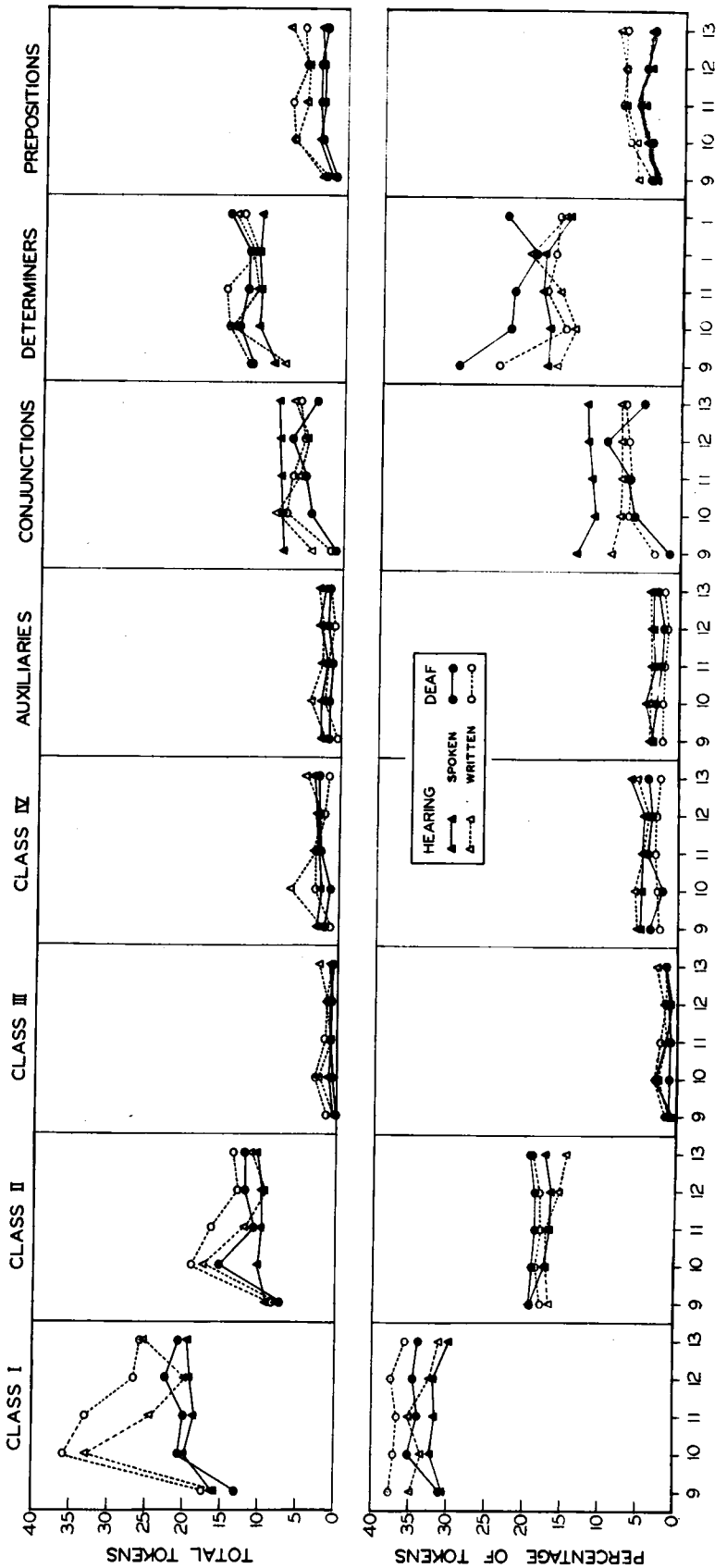


Figure IV

THE NUMBER AND PERCENTAGE OF TOKENS WRITTEN AND SPOKEN IN EIGHT CATEGORIES BY DEAF AND HEARING CHILDREN AT FIVE AGE LEVELS

TABLE XXV

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS OF THE PERCENTAGES OF AUXILIARIES SPOKEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	3.47	2.49	20	3.5	.24	.03	.057	
10	7	2.71	3.06	20	4.1	2.21	1.4	1.296	
11	11	2.18	2.08	20	3.25	1.95	1.07	1.415	
12	8	2.0	1.66	20	3.65	2.33	1.65	1.557	
13	5	2.8	1.72	20	3.35	2.39	.55	.478	

TABLE XXVI

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS OF THE PERCENTAGES OF AUXILIARIES WRITTEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	2.03	1.64	20	3.79	2.46	1.62	1.568	
10	7	2.08	1.81	20	3.70	1.89	1.62	2.073	.05
11	11	1.78	1.79	20	3.65	2.21	1.87	2.38	.05
12	8	1.50	2.64	20	3.47	2.24	1.95	2.186	.05
13	5	1.96	1.40	20	3.62	1.58	1.76	2.214	.05

TABLE XXVII

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS OF THE PERCENTAGES OF CONJUNCTIONS SPOKEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	2.83	2.41	20	6.28	4.72	3.45	1.486	.05
10	7	6.28	3.19	20	11.9	3.88	4.72	2.866	.01
11	11	7.18	4.35	20	12.25	4.45	5.07	3.038	.01
12	8	10.28	2.15	20	12.9	3.90	2.62	1.767	
13	5	5.4	3.72	20	12.6	3.10	7.2	4.72	.01

TABLE XXVIII

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE MEANS OF THE PERCENTAGES OF CONJUNCTIONS WRITTEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	3.40	2.52	20	9.30	3.79	5.90	3.61	.01
10	7	7.26	2.11	20	8.416	3.9	1.16	.7357	
11	11	7.09	3.28	20	8.14	2.86	1.05	.8718	
12	8	7.08	2.17	20	8.26	3.02	1.18	.5379	
13	5	8.00	2.19	20	8.29	2.69	.29	.221	

TABLE XXIX

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE OF THE MEANS OF THE PERCENTAGE OF DETERMINERS SPOKEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	29.67	2.87	20	18.00	5.09	11.67	5.395	.01
10	7	23.28	3.41	20	17.60	4.19	5.68	3.20	.01
11	11	22.73	6.44	20	18.85	4.98	3.88	18.56	.01
12	8	19.5	6.46	20	18.7	4.67	1.2	.546	
13	5	23.8	3.54	20	17.55	4.13	5.25	2.589	.02

TABLE XXX

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE OF THE MEANS OF THE PERCENTAGE OF DETERMINERS WRITTEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	24.89	3.42	20	16.85	4.74	8.04	3.9	.01
10	7	15.70	2.81	20	14.74	4.15	0.96	.561	
11	11	18.05	4.51	20	16.25	4.23	1.80	.967	
12	8	17.07	3.5	20	20.29	4.19	3.22	1.903	
13	5	19.16	3.44	20	18.2	4.47	0.96	.4433	

TABLE XXXI

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE OF THE MEANS OF THE PERCENTAGES OF PREPOSITIONS SPOKEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	4.33	4.71	20	3.85	2.67	.47	.320	
10	7	4.57	2.77	20	5.35	2.33	.78	.723	
11	11	6.0	3.44	20	5.50	2.8	.50	.4345	
12	8	5.13	1.76	20	4.70	2.22	.43	.4835	
13	5	4.2	1.17	20	4.75	2.72	.55	.4343	

TABLE XXXII

TEST OF THE SIGNIFICANCE OF THE DIFFERENCE OF THE MEANS OF THE PERCENTAGES OF PREPOSITIONS WRITTEN BY DEAF AND HEARING CHILDREN

Age	Number	Deaf		Number	Hearing				
		M	SD		M	SD	Md	t	p
9	6	4.77	5.13	20	6.28	3.2	1.51	1.035	
10	7	7.16	2.06	20	6.56	2.61	0.60	.547	
11	11	8.09	1.86	20	7.78	3.04	1.71	1.68	
12	8	7.53	1.93	20	8.0	3.07	0.47	.39	
13	5	7.88	1.99	20	9.09	2.65	1.12	.876	

According to these findings, there was more difference between the groups in the use of structure words than in their use of lexical ones. Significant differences between the means of the two groups occurred with written Auxiliaries (Table XXVI), spoken Conjunctions (Table XXVII), and spoken Determiners (Table XXIX).

While the evidence did exist and the differences were significant, the hypothesis could not be accepted without reservations. The category of Prepositions, for example, showed the groups to be quite similar (Tables XXXI and XXXII). For the other three categories there could be no general statement, but rather each form had to be singled out and analyzed for acceptance or rejection of the hypothesis.

For the written form of Conjunctions and Determiners (Tables XXVIII and XXX) the hypothesis was rejected. For the spoken form of the other category, Auxiliaries, (Table XXV) the hypothesis also had to be rejected.

Nevertheless, for written Auxiliaries (Table XXVI), spoken Conjunctions (Table XXVII), and spoken Determiners (Table XXIX) the hearing did, in fact, exceed the deaf subjects.

CHAPTER V

DISCUSSION OF THE FINDINGS

The preceding chapter has presented data on four aspects of language of two groups of children. As stated in Chapter II, three assumptions guided the research: first, that the study of language is facilitated if it is measurable and can be classified; second, language is determined by variables of structure and vocabulary, which can be described, measured, and classified; and finally, that a difference exists between the two language forms of speaking and writing and to these differences the measures should be sensitive.

Consistent with the assumptions, a studious attempt was made to avoid characterizing language in either inferred or implicit processes. Rather, it was defined in terms of measurable responses with reference to specific behavior of speaking and writing.

The behavior sampled by the compositions included items of structure and syntax and could be broadly classified

into items of a) gross development, b) structural flexibility, c) vocabulary variability, and d) syntactical detail.

Predicated upon the assumption that these phases of behavior are measurable were hypotheses that anticipated some similarity between hearing children and deaf children who learned language in a school dedicated to oral education.

In some respects the behavior was what had been anticipated. In other respects, the results did not support the predictions. Each of the phases required careful examination in order that a better understanding of the language behavior of deaf children could be achieved.

Hypothesis One

The conclusion that the spoken language ability of deaf children equals their written output was justified by the evidence presented in Chapter Four. From Table V it was apparent that the difference in sentence length between writing and speaking, while showing a numerical superiority for the speaking at ages eleven and twelve, was in no case a significant difference although it approached significance at the eleven-year level.

Of interest were the developmental trends of the two forms of expression. Whereas there was evidence of an earlier acceleration and a later cessation of growth for the spoken form, there was a longer and more steady growth for the written form.

The rationale for the similarity between the two forms may very well be that the deaf children experienced an oral education which required them to say as well as write the language structures as they were acquired.

Hypothesis Two

When the spoken sentence length of the deaf and hearing children was compared, two trends were apparent, (Table VI and Figure I) namely, the superiority of the hearing children at all but the eleven and twelve year levels, and a great inconsistency in rate of growth for the deaf.

An analysis of Table VI and Figure I showed that the growth curves of the deaf and hearing children crossed and recrossed at the eleven and twelve-year levels. From a reliable difference in favor of the hearing children at age ten the situation changed to a slight but not significant difference in favor of the deaf at age eleven, and back to a slight but not significant difference in favor of the hearing at twelve, and then to a sizeable and significant difference in favor of the hearing at age thirteen.

Apparently, the deaf showed an earlier growth followed by a decline, whereas the hearing children showed a later growth preceded by an early decline. Taken together these facts may account for the crossing of the curves of growth. Not to be overlooked, however, is the factor of individual differences within a small sample which may account for the inconsistencies.

The author offers no positive explanation of the trends found in Table VI however, it should be pointed out that eight of the eleven children at age eleven and five of the eight at age twelve were day pupils whereas only six of the remaining 18 children were day students. That is to say, at the end of a school day the children returned to their homes and played and participated in activities with their family and neighborhood friends. This gave these children an added advantage of participating with normally hearing and speaking people for more hours than they attended school.

Furthermore, sixteen of these 19 children began their academic program six to eight months earlier than had the other deaf subjects. Whether either of these explanations is the correct one is difficult to evaluate. While the observations tend to support the interpretation, it is nevertheless inferential.

The corollary question to the second hypothesis asked if deaf children wrote sentences of the same length as hearing children spoke. Since it had been demonstrated by Harrell (1957) that the written work of hearing children became superior to their spoken output after age eleven, and since the deaf are required to speak what they write, it was assumed that the written output of the deaf would more closely resemble the spoken output of the hearing subjects. The language development of the hearing subjects did, in fact, follow the pattern shown by Harrell (1957), that is, the spoken output

exceeded the written at age nine, was similar to the written form through age eleven, and from that age on the written exceeded the spoken language.

The deaf on the other hand had an entirely different pattern. The two forms were identical for ages nine and ten, whereupon the spoken exceeded the written at eleven and twelve and then the written form exceeded the spoken. It is to be remembered, however, that these were absolute differences but they are not significant differences. Nevertheless, the differences between the written sentence length of the deaf subjects and the spoken sentence length of the hearing subjects were significant at every age level (Table VII). The hearing children wrote longer sentences at every age level and the differences ranged from 1.51 words to 4.29 words. However, it should be noted that the growth curve of the written sentence length of the deaf children more closely resembled the growth curve of the written sentence length of the hearing children (Figure I).

Hypothesis Three

The third phase of the investigations studied the differences between the written ability of the hearing children and the written and spoken expression of deaf children. Two basic questions emerged as this hypothesis was investigated. One, do hearing children write sentences of the same length as deaf children and, two, do hearing children write sentences of the same length as deaf children speak?

Increase in written sentence length with increase in age was consistent for both groups of subjects. The more important features of Table VIII, aside from the rather consistent age differences, were the reliability of the differences at ages nine, ten, twelve, and thirteen, and the lack of any such reliable differences at age eleven. This feature at this age seemed to be consistent throughout several of the analyses. Whether it could be attributed to the causes mentioned earlier, those of age of entrance into school and place of residence or whether it is due to chance factors, the author found difficult to postulate.

The developmental differences should be noted in Table VIII also. While the deaf children continued to increase their written sentence length, although at a slower rate than did the hearing, the limits to which they would continue to increase were not indicated in this study. But in view of the greater total growth of the hearing children during the period studied here, one might be justified in assuming that they would continue to surpass the deaf subjects.

It should be noted here, however, that the written sentence length for the deaf children in this study exceeded that given for deaf subjects in two previous studies (Myklebust, 1960) and (Heider and Heider, 1940).

Of the possible explanations that could account for the differences among the studies, two are offered here as being perhaps the most important. First, it is likely that the differences among these studies can be attributed to the type of stimulus used to elicit the responses since there is evidence that the type of composition affects the kind of sentence used (Seegars, 1943). Yet the Heiders (1940) stimulus was a movie requiring narration as did the pictures in the present study. Like the present investigator, Myklebust (1960) elicited responses by means of a picture story therefore, the author tended to reject the first explanation.

A second explanation for the differences among the studies may be the differences in the school populations from which the samples were drawn. One of these differences in population may be found in the type of education fostered. Unlike the subjects in the previous investigations, all of the deaf children in this study were pupils in an entirely oral program. This means that in addition to discussing structural features of language and paraphrasing it, they had to interpret supplementary examples and finally put into speech and writing complex sentence structures as required for everyday communication.

When the written sentence lengths of the hearing children were compared to the spoken sentence lengths of the deaf subjects, the inconsistencies of the latter were noticeable (Table IX). While the hearing children continued

to write increasingly longer sentences with increase in age, the deaf children showed a sharp acceleration through age eleven, whereupon they began to speak successively shorter sentences through age thirteen.

It could be speculated that one of three factors was at work. One, that the normal pattern of superiority of written over the spoken in older children as shown by Harrell (1957) and substantiated by this study was functioning with the deaf children. This immediately raised the unanswerable question of why the big but not significant gap between the deaf children's written and spoken form at ages eleven and twelve. Or it could be that the spoken form continued to get emphasized through the intermediate levels and only at the oldest level did writing take precedence. It was this notion that the author was inclined to hold. Or, three, it may be that teachers of the older children were so engrossed in teaching content and vocabulary of all the school subjects that the opportunities for the children to speak complex sentence forms diminished.

Whatever the reason, the spoken sentences of the deaf were not as long as were the written sentences of the hearing, save at age eleven. Neither, however, were they as long as the spoken sentences of the hearing. The same generalizations could be made about the written sentences of the deaf. They were not as long as either the written or the spoken ones of the hearing. Therefore, it must be

concluded that when the sentence length was the measure of language development, the importance of hearing was obvious. Auditory deprivation did retard language growth.

Hypothesis Four

The fourth hypothesis investigated the amount of flexibility the two groups manifested in structure and vocabulary.

Subordination Ratio

The measure which was believed to get at structural flexibility with a single score was that of the subordination ratio. It is a measure not affected by punctuation and yet describes qualitatively sentence maturity.

It should be remembered that authors who have studied the development of language in children have found or have recognized that an increase in sentence complexity, that is, an increase in the use of dependent clauses, is characteristic of the child's growth in language ability (Smith, 1926).

Not all investigators who have measured sentence complexity have used the same technique of measurement, however. Some have used sentence classification; others have used the subordinate clause. Like LaBrant (1933), the present author analyzed her material by counting the verbs (Class II words) in independent and subordinate

clauses, and expressed sentence complexity by finding the ratio of dependent verbs in subordinate clauses to the number of independent verbs in the independent clauses.

The results of the present study were in agreement with the findings of LaBrant (1933) and tended to agree with others (Harrell, 1957; Heider and Heider, 1960), in that there was a definite trend for the hearing children to use a greater amount of subordination with increase in age (Figure II). As seen in Table X, the increase in the means in the written form from one age to the next, except for the ten-year level, was fairly constant, beginning with a mean of .12 at nine and increasing to .35 at thirteen years. Thus the thirteen-year-olds used a little less than three times as many dependent clauses as the nine-year-olds.

The findings of the present study were converted to percentages and compared with the previous studies in Table XXXIII. An inspection of this table revealed that all four studies showed an increase in the subordination ratio with increasing age, but there was, with one exception, considerable variation in the subordination ratios found for similar age groups among these studies. The exception was the similarity between the ratios of LaBrant (1933) and those of the hearing in the present study.

TABLE XXXIII

COMPARISON OF WRITTEN SUBORDINATION RATIOS OBTAINED IN THE PRESENT STUDY WITH THOSE OF THREE OTHER STUDIES

	AGES				
STUDY	9	10	11	12	13
This Study (Hearing)	12.1	23.2	19.2	21.5	35.0
Harrell	11.6		15.6		19.6
LaBrant	19.0		21.2		31.1
Heider-Heider (Hearing)	12.0	13.0	15.0	15.0	17.0
This Study (Deaf)	5.2	24.6	10.6	12.8	8.0
Heider-Heider (Deaf)			7.0	4.0	9.0

As with writing, so with speech, the hearing children tended to use a larger ratio of subordination with advance in age. This trend was neither as marked or as regular as was the trend in the written samples. The lowest ratio for the spoken stories of the hearing was .162 at the nine-year-level while the highest was .292 at the thirteen-year-level. This same trend was reported by Harrell (1957) who also compared written to spoken compositions of normal

children. His indices of subordination in speaking were also lower than the ones he found in writing, as was true of data for the three older levels in this study. On the other hand, the spoken ratio in these data was inconsistent in the three younger levels. Unlike the differences with the three older levels, which were significant (Table XI), the differences at the two younger levels were not.

The only other study reporting subordination indices based on spoken language was that of Davis (1937) who found subordination ratios for 5 1/2 through 9 1/2 year-olds. Only the latter age was of interest at this time, and for this group she reported an index of 17.0. Why her ratio more closely resembled the present data when her responses came from free play and why the two ratios differed from Harrell"s (Table XXXIV) who stimulated the expression by a movie, was not apparent.

Since there are no studies that have had as their purpose the investigations of the reasons for difference between children's written and oral language, the explanations given here are only suggestive.

One explanation which seems apparent is that hearing children receive more instruction in grammar in their written lessons than in their speech lessons in the intermediate and upper grades. Speech lessons are concerned with what is to be said, while writing lessons are concerned with the mechanics of writing.

TABLE XXXIV

COMPARISON OF SPOKEN SUBORDINATION RATIOS OBTAINED IN THE PRESENT STUDY WITH THOSE OF TWO OTHER STUDIES

	AGES				
STUDY	9	10	11	12	13
This Study (Hearing)	16.2	26.4	14.8	9.3	29.2
This Study (Deaf)	15.8	17.6	10.4	16.6	6.8
Harrell	11.6		12.8		15.7
Davis	17.0				

Another explanation which is closely related to instruction in grammar is that writing is usually phrased more formally than speech. Evidence that informal language incorporates fewer subordinate clauses may be found in the studies of Frogner (1933) and Boyd (1927).

A third explanation for the difference in mean subordination ratios between written and spoken output can be attributed to the fact that the writer, unlike the speaker, is able to arrange his thoughts before he expresses himself and would most certainly result in more complex structures.

The language samples of the deaf children, contrary to those of the hearing, showed great inconsistency in both

forms, with a regression in development from age ten (Figure II). Unlike the hearing group the deaf children showed no statistically significant difference between the two forms at any level (Table XI). While this measure was not used to test the hypothesis that the speaking ability of the deaf was equal to their writing ability, it could substantiate the previous findings and confirm the acceptance of the hypothesis.

When the written subordination ratio of the deaf was compared with that of the hearing, the difference was significant at the three older levels (eleven, twelve, and thirteen years). (Table XIII). The ratios found for the deaf children in the present study were higher than those found by the sole investigators of subordination in deaf children (Heider and Heider, 1940). Again the difference may be accounted for by the type of education the present subjects were receiving. It is to be recalled that these children were being given an oral education whereas those in the Heiders' were getting a more hetergeneous type of education. Nevertheless, both studies support the hypothesis that older deaf children use complex structures less than do the older hearing children. When the spoken form from the deaf and hearing groups in this investigation were compared, the differences were not significant for the three younger groups (Table XIV). At the twelve-year-level an ambiguous situation existed. It is to be remembered that in the analysis of variance of the

subordination ratio (Table XII) the interaction between groups and forms was significant at the .01 per cent level at age twelve. The difference between the means of the spoken output at this age was significant in favor of the deaf group.

The only explanation the author can offer is that the children at that age in this study were engaged in the study of subordination in class at the time and were making an effort to use it in speaking. This explanation seems to be valid when the general curriculum was examined.

Therefore the data support the hypothesis that the deaf children are retarded in structural flexibility in comparison with hearing children.

Type-Token Ratio

As described in Chapter IV, the type-token ratio (TRR) was used to test the differences between the groups in vocabulary flexibility.

Both the written and spoken type-token ratios of the two groups appeared to be relatively stable measures, showing little growth tendencies (Figure III). This stabilization of the ratio was also noted by Templin (1957), who found approximately one different word for "Slightly over every two words uttered." On the other hand, Chotlos (1944), who studied written compositions of older children, found a higher numerical value for the type-token ratio with increase in age. While he does not publish the ratios he found for the population, he does, however, give the ratios determined for six

100-word segments of a written sample of a fifteen-year-old, and they range from .689 to .715. The range of the means in the present study is .629 to .717.

Hardy (1958) did measure the language of hearing impaired children using the type-token ratio, but their ratios were obtained for language samples of 837.75 tokens for the hearing impaired and 927.45 for the hearing group. Therefore, the ratios of .31 for the hearing impaired and .303 for the control cannot be compared to the present investigation where the total output of tokens ranged from 46.14 to 103.3 words.

The influence of the total output on the type-token ratio was reflected more in the writings of the hearing children than in the writings of the deaf. The hearing children at the ten-year-level wrote the greatest number of tokens and a type-token ratio of .629 resulted, at nine years they obtained the .717 ratio. The deaf subjects, on the other hand, received a type-token ratio of .592 for the smallest number of tokens (44.47) whereas for their largest output of 100.27 words they obtained a ratio of .564.

This measure was used by one investigator (Mann, 1944) to compare spoken and written language of college freshmen and schzophrenic patients. For 100-word segments she obtained type-token ratios of .7135 for the written and .6416 for the spoken compositions of the college freshmen. Apparently the group in this study had not reached the maximum in use of different words and possibly the trend begun at the thirteen-year level continued as the children increased in age.

The differences between forms noted by Mann (1944) were not present in this study in the language of the hearing group although the deaf showed slight, but not significant, differences in favor of the spoken form. Except for the overlapping at age twelve, which gave a significant interaction (Table XVI), the differences between the deaf and the hearing were unambigous and significant (Table XVI).

The redundancy of the deaf was apparent in compositions such as

> A girl took off a shoe. A dog looked at the shoe. The girl didn't look at the dog. The dog took the shoe away. The girl didn't know that the dog took the shoe away.

In that composition there were 14 types making up 36 tokens giving a type-token ratio of .39. Every sentence was correct but, nevertheless, rigid and stereotyped. Samples such as this were not just found at the younger levels but continued throughout the ages sampled.

The conclusion justified by the evidence presented is that higher type-token ratios characterize more advanced language ability and apparently auditory experiences are important factors in the development in flexibility.

While the explanation of auditory deprivation, whereby the child is limited to language perception of that within his vision, may be the only valid one, the author feels some of the rigidity might be attributed to the type of language given to the child to perceive. Teachers and parents in their anxiety to be understood tend to "rubber stamp" their

own output. That is, they tend to code in the same language the children have given evidence they understand. Instead of saying, "The girl has a big red balloon," the speakers to the deaf children may elongate the message and provide repetitions which are redundant; for example: "The girl has a balloon. The balloon is big. It is red." The latter group of words are easier to lipread than is the first sentence but, nevertheless, this is frequently the redundant pattern given the deaf children to perceive at all age levels.

Hypothesis Five

The next area investigated was that of structural and syntactical detail. To analyze this aspect, the words which the children used were classified into lexical and structural categories and the relative frequency of use of each category was computed.

It was with the first four of the categories that hypothesis five was concerned. The significance of the differences between the percentage of words as well as the means were in Tables XVII through XXIV, and the data were shown graphically in Figure IV. The outstanding characteristic of the latter was the flatness of the curves in each of the lexical categories. This stability of frequency of use of the parts of speech was observed by McCarthy (1930) and Templin (1957). In fact, the actual percentages reported by McCarthy were comparable to those found in the present study.

Each of the categories is worthy of attention, particularly those in which the groups differed.

Class I

Class I words are those words which pattern after "the" and might be called "nouns" in the traditional classifications. However, they do not coincide, since Class I includes such words as "he," "another," and "one," whereas in traditional grammar they would be in another category. Although the deaf subjects spoke and wrote a greater per cent of Class I words than did the hearing, the difference was significant only for the written form at the two oldest age levels (Tables XVII and XVIII). These findings were unlike those of Myklebust (1960) who found some deaf children to write only nouns. In fact, he wrote:

> ...100 per cent scores occurred with some frequency through 11 years for the deaf and even at 13 and 15 age levels, some of them having noun scores of 90 per cent. (p. 302)

No child in this investigation wrote more than 54 per cent of Class I words or spoke more than 52 per cent. The deaf children, because of their unique syntax, had to draw heavily upon their store of Class I words in order to construct their large number of simple structures. Their extensive use of simple and simple elaborate sentences caused not only an increase in the use of Class I words, but also limited the use of many function words. To illustrate:

> One day a boy went fishing. The boy took a fish. Two turtles jumped in the water. The boy jumped in the water. The boy put a fish in the water. The turtle ate the fish.

The deaf children frequently used a single name for an object, whereas the hearing subjects were more flexible. While the hearing children would refer to a male child as "boy," "he," "child," "young man," "urchin," "friend," "kid," et cetera, the deaf would call him only "boy." Another example of the richness of the language of the hearing group was in the prepositions elicited by Picture 1-2 in which the making of lemonade was the topic. The hearing children would refer to the lemonade as "soda," "drink," "refreshments," "juice," "it," "something," "lemonade," "liquid," and "mixture," while the deaf group used only "lemonade."

This is not an attempt to suggest a scale of low to high differentiation but rather to point out that the deaf while using a greater number of Class I words used less diversity among the words. While these were absolute differences, they were not significant differences, however, except for the two previously mentioned differences between the two groups at the two older levels in writing.

Class II

Words in this class resemble the traditional linking, transitive, and intransitive verb classification, but auxiliaries have a separate category under structure words. The deaf

subjects both spoke and wrote more Class II words than did the hearing children, but here again the difference was not significant except for the twelve and thirteen-year-olds in writing (Tables XIX and XX). On the other hand, Myklebust (1960) when comparing the median percentage scores of deaf and hearing children, found the hearing to use more verbs and attributed the small usage of the deaf to their omission of the verb. In fact, he reported zero scores from both populations:

> ...but more deaf children at all age levels have zero scores; they use no verbs. Such scores appeared throughout the total age range for the hearing impaired but only through the age level of nine years for the normal. (p. 303)

In the present study four words were the smallest number of Class II words used and that equaled 12 per cent of that individual's tokens. Another subject used as many as 34, comprising 17 per cent of his total. The range in speaking was from five Class II words (14 per cent) to 17 (19 per cent). Although there were no zero scores, one hearing child used only two Class II words, or 7 per cent of his total.

Apparently, these children were aware of the role of Class II words in sentence formation. However, when the word was omitted, it was usually occasioned by an incomplete clause in a complex sentence as, "The boy who threw the ball." It was the extraneous words in this category, rather than the omissions, which contributed to the uniqueness of the language of the deaf pupils. This

probably accounted for the increased usage with which they were credited. There were sentences such as, "The girl got lost her shoe," "They went run run away," "They wanted earned more money," "They has a little brother who is watching they are talking named Zeke." In the latter sentence three Class II words were scored: "has," "watching" and "talking;" two auxiliaries counted: "is," "are," and the particle "named."

Unfortunately the factor of the auxiliaries makes the findings of this study difficult to compare with previous investigations. At first glance the percentages assigned here were quite low when compared to values usually ascribed to the verb category. Herdan (1956) lists 21.3, 21.7, and 20.8 per cent to Dante's Inferno, Purgatorio, and Paradiso. The bases for these figures, however, were quite large--over 9,000 words per volume. Templin (1957) reported that the spoken form of three-year-olds contained 22.6 per cent verbs which increased to 24.3 per cent by age eight. Mann (1944) found 22.95 per cent verbs in the spoken language of college freshman, but 18.71 per cent in the written language. The discrepancy between those findings and the present study can be understood when a description of the classification is given. Mann classified as verbs:

> ...simple verbs, participles plus auxiliaries, gerunds, and participles unless the dictionary recognizes them as nouns and adjectives, as the case may be. (p. 49)

Templin derived her count in the following manner:

> Each part of a verbal combination is counted as a separate word; thus 'have been playing' is counted as three words. (p. 160)

On the other hand, the classification system used in this study was that of Fries (1952) and by this system "have been playing" would not have been counted as three verbs but rather one verb and two auxiliaries. Therefore, if a direct comparison were deemed necessary, it would be advisable to combine the percentage of auxiliaries with those of Class II words. By inspection, it can be seen that these two categories totaled within the range described in the literature. It might safely be said then that the stimuli of this study elicited a normal percentage of "verbs" from both deaf and hearing subjects.

Class III

A Class III word fits both in the position after a Class II word and between "the" and a Class I word. Basically these are the words that structure like "good" in the frame, "The good _____is/was good."

In this study Class III words ranked last in the relative amount of usage and the actual number used.

The deaf children wrote and spoke a higher percentage of Class III words than did the hearing at three out of the five comparable age levels, but it is true that the results obtained from the date on Class III words may have been inadequate since there were so many zero scores in the stories

of both groups with resulting high standard deviations. (Tables XXI and XXII) It should be noted, however, that no deaf child had a zero score for all compositions and only one hearing child maintained a zero score throughout the two forms. Three other hearing children wrote no Class III words, but they did use them in speaking. At no age level was there a zero score for every one in the group. In other words, except for the one hearing child, everyone used at least one Class III words in one story and another used 14 at age ten. One nine-year-old hearing child used five also, and three ten-year-old hearing subjects used as many as ten tokens in this category.

This was contrary to the findings of Myklebust (1960) who said:

> ...a number of deaf children throughout the age range studied used no adjectives. In fact, more 15 year old deaf children than nine year old hearing children did not use adjectives in their stories. (p. 307)

The clustering within the narrow range (.55 - 2.75 per cent) was not unexpected for words in this category, since Laughlin (1932) and Goldsmith (1932) found little difference in this part of speech from grade to grade. Templin (1957) showed a small range, but her percentages were higher over the five-year spread (6.3 - 7.4 per cent). The college freshmen in Fairbanks study (1944) used 6.69 per cent in speaking, but Mann (1944) found a higher per cent in writing (8.33) for a comparable group of freshmen. Herdan (1956), in showing the constancy of grammatical coding, gave the percentages of

adjectives in Dante's Comedia as 5.6, 6.2, and 6.9. Carroll (1938) on the other hand, said:

> ...adjectives provide an easy approach to the minute details of syntax because they occur frequently and constitute a relatively large part of the total number of words. (p. 228)

He gave 15 per cent as the expected frequency but the magnitude is probably attributable to the fact that he was studying enumerative and determining adjectives and therefore included articles.

Although Templin (1957) did not give the criteria she used for classifying this part of speech, she obviously did not include the articles.

The rule Mann (1944) followed was:

> ...regular classification, and any verb form (i.e., participle) which the dictionary recognizes as an adjective. (p. 49)

and Fairbanks (1944) elaborated:

> ...That nouns used as an adjective were tabulated as an adjective only if the dictionary gave the adjectival use as possible. For example, 'family' in the combination 'family prayers' was considered as an adjective as the dictionary gives this usage. However, the word 'football' in the combination 'football championship' was tabulated as a noun as no adjectival use is mentioned in the dictionary. (p. 27)

In the present study, the participles were included in Class III words, but modifying nouns are not unless they can be restated in the pattern "A thing is a thing that is _____." (Roberts, 1958, p. 160). Hence the word "family" in the combination "family prayers" would have been

ruled out because it could not pattern in "Prayers are things that are family." These words were classified as Class I Modifiers and not Class II tokens.

Many words in the category of Determiners would appear as Class III words if the dictionary were to serve as the criterion. Words such as "several," "many," "both," "either," "every," are given adjectival quality in the dictionary; but according to Fries (1952) they pattern as structure words in place of "the."

An examination of the kinds of tokens revealed that the deaf children used a greater number of Class III words in the position following the linking verb, sometimes called the predicate adjective by grammarians. This was true for both the spoken and the written form. On the other hand, the hearing subjects used a greater percentage of these words in the modifying position. The extreme use of the predicate adjective by the deaf pupils is possibly a verbal pattern carried over from their early education when they learn, "The boy is hungry. The girl is thirsty."

Again, whether the rigidity of use of only predicate adjectives was a result of teaching, auditory deprivation, or "rubber stamping" by teachers and family was difficult to ascertain. The fact remained that although the children used as many Class III words as hearing children, the manner of use differed.

It was also difficult to ascertain whether the paucity of Class III words was due to the classifying system employed, to the stimuli, to both, or whether there was in fact, a meagerness of words in this category in the output of these children. The original task, however, was accomplished and that was to determine the number, the percentage of words in Class III used by deaf and hearing children, for the given verbal task.

Class IV

Although the relative proportion of Class IV words (See Appendix) was small, the hearing children both wrote and spoke more than did the deaf children. While there were absolute differences, they were significant in speaking only at ten and in writing at ten and thirteen. (Tables XXIII and XXIV). Nevertheless, the deaf group used this part of speech, a fact which differed from the findings of Myklebust (1960), who stated that the deaf subjects use "virtually no adverbs" and that

> ...they (adverbs) were never acquired to a useful extent when deafness is present from early life. (p. 307)

While it is true that on occasion some of the deaf children used no Class IV words in this study, the number of subjects doing so was small. Only three received zero scores in speaking, but four hearing children spoke none. Furthermore, no child wrote all five papers without a single Class IV word.

The stimuli, however, seemed to influence this category more than the other parts of speech. Picture 1-4, (See appendix) for example, elicited the largest number of zero scores for both groups (17 deaf and 22 hearing children); whereas, picture 1-5 produced few zeros (two deaf and seven hearing subjects). Evidently, building a lemonade stand did not inspire the richness of language that the other situations did. While Picture 1-2 required the smallest proportion of Class IV words, Picture 1-10 elicited the largest proportion (Table XXVI).

Although the tokens were inspected for type, no statistical analysis was made within the categories, but it was interesting to note the use of time, place and manner. A sentence such as, "He pulled out the fish rapidly later," contained three Class IV tokens: one of place (out), one of manner (rapidly), and one of time (later.) Authorities have said that the largest subgroup is that of manner (Roberts, 1958, p. 162), but in this study both groups used more tokens of place than they did of manner, and tokens of time followed second in order.

It is interesting that the hearing group wrote and spoke a larger proportion of Class IV tokens of manner and place than did the deaf children, but the differences with time tokens were not as great.

That age has some influence on this part of speech has been demonstrated, and the age at which this study terminated

for the hearing children was too early to see the effect of maturity upon the overall aspect of Class IV words.

The percentage computed by French, Carter, and Koenig (1930) in a study of telephone conversations was 10.06 for adjectives and adverbs combined, while Herdan (1956) reported 11.6 per cent for just adverbs from the data on the Comedies by Dante. Mann (1944) recorded 8.34 per cent for the written adverbs in compositions of college freshmen, while Fairbanks (1944) gave 10.16 per cent for the spoken adverbs from a similar group of freshmen. However, Horn (1927) as reported by Fairbanks (1944) listed only 5.65 per cent with a range of 2.5 to 8.8 per cent from the spoken language samples of children.

Templin (1957) found between 9.1 to 10.6 percentage adverbs in the spoken conversations of three through eight-year-old children, while Young (1941) reported a range of 7.0 to 13.0 for children three to five years; yet McCarthy (1930) recorded as few as 5.9 per cent for four-year-olds. Further comparisons with other investigators (Boyd, 1927; Day, 1932; Smith, 1926) resulted in differences of 5 to 10 per cent. Since similar techniques in securing the data were employed by several of the investigators, it would seem that the results should have been similar. Such was not the case, and it appeared that the differences in the grammatical classification may have accounted for the major part of the differences. The investigators gave very few rules for

classifying the material. Most of them simply mentioned the dictionary as the criterion. Although Young (1941) in a footnote called attention to the fact that she included pronominal adverbs (p. 89), the rule given by Mann (1944) was more typical: "Adverbs - regular classification (p. 49)."

In the present study, the Intensifiers, one of the categories of structure words tabulated, would probably have been considered as traditional adverbs because they were the words "that modify an adjective or another adverb." They are words like "very" in "He was very thirsty," or "pretty" in "He pulled in the line pretty slowly." However, these words did not appear in the statistical data described in Chapter IV, since they comprised less than two per cent of the total number of words. Nevertheless, even the small percentage would alter the percentage of Class IV words if the Intensifiers had been added to them. Furthermore, if relative pronouns or conjunctive adverbs were also added, the percentage would once more have been changed.

Class IV words are a complicated class and provide much opportunity for confusion. Even conventional grammar books vary in what should be included under the term "adverb", but this was one of many reasons why the linguistic categories rather than the traditional "Parts-of-Speech" were chosen to classify the tokens in this study. Any attempt to equate adverbs and Class IV words is unorthodox and opposed by Fries (1952). However, the present study is an initial

one comparing deaf with hearing subjects along these dimensions, and the comparisons with normative data had to be limited to the few investigations described above. These comparisons suggested that the language of hearing children in the present study resembled that described as normal.

Hypothesis Six

The last phase of the study sought the answer to the question of whether the hearing children would exceed the deaf in their use of words in the function or structure categories.

In addition to the parts of speech classes there is an indefinite number of structure groups whose role it is to expand and combine English sentence patterns in various ways. The actual number of tokens in these groups is small as explained by Fries (1952).

> ...the total number of the separate items from our materials making up the fifteen groups amounted to only 154. Although the separate items are few they occur very frequently - so frequently indeed that these 154 items, some of them repeated in every utterance make up about one-third of the total bulk. (p. 104)

The use of these tokens in the function classes is important since they tie together the lexical symbols into sentence structures, but defining these words is difficult, for example: "shall," "as," "and", but for the English syntax to be satisfactorily utilized, they must be known and used correctly.

The function groups in this study included the Auxiliaries, Conjunctions, Determiners, Intensifiers, Prepositions, Interjections, and a miscellaneous category. In the analysis of results, only four of the groups were considered, since Intensifiers, Interjections, and the miscellaneous ones totaled less than twelve per cent of the overall total. The same procedure was followed with the words in the function groups as with those in the parts-of-speech classes, that is: words were classified, counted, and the percentage of total tokens found.

Auxiliaries

The least frequently used category in the function group was Auxiliaries, which ranked low not only in total number tokens but in percentage of tokens used by both deaf and hearing subjects. The number and percentage approximated the Class III tokens.

While few in number, the types in this group are important because they serve as signals to Class II words and dictate tense, mood, person, number and voice. Since they defy definition, knowledge of the important role must be acquired by the children through reinforcement presumably through the auditory or some substitute modality. While the hearing wrote a significantly greater proportion of Auxiliaries than did the deaf, the difference in speaking was not great nor significant.

It should be noted that although all of the pictures could have been discussed or described in a tense requiring no Auxiliaries, only one deaf child chose to do so. Every hearing child employed Auxiliaries for at least two of the five pictures. The difference in actual words used however is worthy of note. The four most frequently used items in the spoken language of the deaf subjects were "was," "did," "is," and "are," in that order. The hearing children on the other hand used "are," "is," "was," and "were" in that order. On further examination, it was found that the "was" used most frequently by the deaf children invariably occurred in the verbal pattern, "The window was broken." Actually, it indicates past tense, passive voice but in this situation the item "was" was probably intended as a linking verb, and possibly "broken" should have been considered as a Class III participle since this is the way it is taught. At the time the children learn "The boy was happy," they are also taught, "The cup was broken," and the doer of the action is not considered. In contrast, the hearing children as early as eight years used "was running" and "was playing" quite frequently.

When the item "was" was used by the deaf children to denote past progressive time, they evidenced difficulty, not with the auxiliary, but the word which it signaled, "..was threw in the window and the window was break." The hearing children had no similar difficulty.

Another characteristic unique to the deaf children was the rigidity with which the negative was expressed. In variably they found it easier to say "The woman did not run," or "The boy did not catch the ball," than to use any other pattern. It interfered with the expression of a double negative when they might have said, "I don't think she did not know whose fault it was." Evidence of the question pattern giving trouble when combined with the negative was seen. The question, "What did they do?" is taught as a pattern but the children could not manipulate the indirect form in sentences as "They did not know what did they do."

Although both groups had shifts in verb tenses, the deaf children seemed to have more difficulty selecting the auxiliary and they seemed to be more aware of number than of time; that is, "Mrs. Black got out of the house and saw the baseball thing and found out what is happening." The hearing subjects, on the other hand, shifted tenses following a clause; that is, "Some boys are ready to play baseball and so a girl who pitches was pitching and then..."

The present tenses were used most often in the spoken version by the hearing children and this was indicated by the Auxiliaries "are," and "is," whereas the deaf children utilized the simple past tense in the active voice except for the expression "was broken."

In the written sample the hearing subjects used "were," "could," and "did" in that order, while the deaf used "did," and "were" but in place of the modal auxiliary "could" used by the hearing, the deaf used "was." As can be seen in Lists 1 and 2, the hearing group used the future auxiliary infrequently but instead used the modal auxiliary often. Although "could" did appear on the list of those used by the deaf children, "can" did not.

The hearing pupils used the past tenses in writing more often than the present and the deaf students continued to use the past tense with occasional use of the progressive past in the three oldest levels.

The deaf children were credited with excessive use of the auxiliary and this occurred often when the participle followed certain verbs as "saw" and "felt" as in "They saw the children was drinking sodas," or "They felt the fish was pulling the pole." In contrast, the hearing pupils rarely used auxiliaries excessively, but the few that did occur were occasioned by the use of the subjunctive mood - "Then they could buy as much soda as they had desired."

Conjunctions

It is true that this function group is frequently separated into subgroupings. The linguists occasionally divide Conjunctions into "sentence connectors," "subordinators," and "conjunctions," the latter being used between words and the

List 1

LIST OF AUXILIARIES SPOKEN BY DEAF AND HEARING CHILDREN

Deaf Children		Hearing Children	
Word	f	Word	f
was	20	was	27
did	13	did	17
is	11	is	54
are	8	are	60
do	8	---	--
were	5	were	41
will	4	will	5
would	3	would	7
had to	2	---	--
could	2	could	5
had	1	had	9
does	1	does	3
		have	6
		can	5
		might	4
		gets	1
		got	1
		has	1
		been	1

List 2

LIST OF AUXILIARIES WRITTEN IN RESPONSE TO ONE PICTURE BY DEAF AND HEARING CHILDREN

Deaf Children		Hearing Children	
Word	f	Word	f
did	13	did	23
were	11	were	58
will	10	will	5
do	9	do	10
was	4	was	10
could	3	could	32
would	2	would	17
had	2	had	10
are	1	are	20
be	1	be	1
should	1	---	---
might	1	might	2
		have	4
		can	5
		is	4
		must	2
		got	1
		may	1
		started	1
		kept	1
		am	1
		begin	1

former two with sentence patterns. Traditional grammar texts on the other hand classify Conjunctions into co-ordinating, subordinating, correlative, and pronominal groups.

However, the concern in the present study was in the role the Conjunctions played in signalling sequences whether they were parts of sentences or the sentences themselves. Accordingly, no distinction was made in the tabulations.

As can be seen in Figure IV, Conjunctions ranked fourth in both number and per cent of all classes and function groups studied. Among the function groups they were second in importance.

The data in this study agreed with those of Myklebust, (1960), in that the hearing children had acquired facility in the use of Conjunctions at nine years of age but other than that the findings contrast.

Myklebust (1960) found Conjunctions to be "next to the last in order of frequency of parts of speech studied" (p. 306) whereas the present investigator found it midway or fourth from the last. Myklebust did not note any appearance of Conjunctions in the language of the deaf until eleven years, whereas in the present study, the nine-year-old deaf used both spoken and written Conjunctions though not to the degree that the hearing subjects did. Furthermore, Myklebust also found "a number of the hearing impaired even at 15 years of age did not use this part of speech." (p. 307)

It is true that four deaf subjects used no Conjunctions in their spoken sample, but two hearing children neglected to do so also. In the written version no child, deaf or hearing, received more than one zero score on the five written compositions.

In fact, the hearing subjects were inclined to use an excessive amount of connectors and this accounted for the greatest number of errors in the Conjunction category both in their spoken and written compositions. The simple connector "and" was frequently used to join unrelated sentence patterns.

The deaf children too used "and" as an excessive connector, but they were also credited with excessive Conjunctions for patterns which were unique to them; that is: "When they went home and they went in the kitchen;" "When Paul picked it up and Joe said;" "Trudy said that of course."

Both groups experienced difficulty with the correct choice of Conjunctions. The hearing wrote such sentences as, "Joe is putting his fish in the water when the turtles are going in;" "A boy that has been fishing...;" and similarly the deaf children had difficulty; that is: "Bob was surprised why Bill did that;" "While the turtles were through, Bill picked up the fish."

Just as the hearing group omitted Conjunctions like "that" in "Dick is showing off the string of fish he caught;" or "The other boy puts his catch in the water so they won't

get hurt;" so did the deaf subjects; that is: "Two boys saw something's wrong in the water;" "They didn't recognize the fish was eaten by the turtles;" "Tom saw two children was drinking soda."

A difference in number of types was apparent when the actual Conjunctions used were examined. The hearing used twenty-two types in their spoken form, whereas the deaf employed only eleven (List 3). Those of the deaf lacked many that signaled subordination.

The errors of use, omission, and choice contributed greatly to the uniqueness of the language expression of the deaf children; for example:

> The boy looked at a fish. The boy threw a fishing in a water. He put put on the fish. Two turtles walk under the water. Two turtles ate a fish. It is good. Then the boy didn't know a turtle.

Not only did the errors make the language unusual, but the redundancy added greatly to its character.

The findings of the study by Wells (1940) who compared deaf and hearing children using subordinate, coordinate, and relative pronouns appeared to be in agreement with the present study. He found in the percentage of subordinating conjunctions that the hearing subjects exceeded the deaf and that the hearing subjects made their most rapid growth at the third and fourth grade levels with a comparatively small increase at the upper level, sixth grade. The deaf, aside from unusually large increase at the third-grade level, showed a rapid growth

List 3

LIST OF CONJUNCTIONS SPOKEN BY DEAF AND HEARING CHILDREN

Deaf Children		Hearing Children	
Word	f	Word	f
and	117	and	639
who	22	who	39
so	11	so	28
that	14	that	27
when	8	when	28
what	2	what	16
---	--	like	14
but	8	but	10
if	3	if	9
---	--	where	8
because	11	because	4
---	--	as - as	4
---	--	after	3
---	--	only	3
while	1	while	2
---	--	whose	2
---	--	whatever	1
---	--	before	1
too	2	except	1
		or	1
		which	1
		whenever	1

through the different grades, which he took to indicate that final maturity in the use of subordinating conjunctions comes at a considerably later age for the deaf than for the hearing. With coordinating conjunctions Wells found, "...the deaf boys excel the normal at Grade II and are only slightly below the normal at the third and fourth-grad levels, but above at the fifth and sixth. Both groups showed practically no growth after the third grade." (p. 54)

Relative pronouns, however, were almost completely absent in the language of deaf pupils according to Wells, but he did report a growth of from .05 per cent at Grade II to .02 per cent at grade VI.

Wells (1940) showed the relative pronouns to be few in the language expression of his deaf groups. Although the subgroupings were not analyzed, upon inspection it appeared that relative pronouns were few in the present study also. While the deaf children used a smaller proportion than did the hearing, neither group achieved the level of Wells's subjects, but the total output of tokens was smaller in this study than in Wells's, so some of the difference could be attributed to that.

Actually, the proportion of all Conjunctions of both groups in the present study compared more favorably with data found with adult groups. Fairbanks (1944) reported a range of 7.33 to 11.40 per cent with a mean of 8.83 in spoken samples from college freshmen. Mann (1944) gave a mean of 6.55 with a range of 4.32 to 8.29 per cent in the written compositions of

the same age group.

However, Horn (1927), as reported by Fairbanks (1944) credited children with only 1.5 per cent and Templin (1957) found the highest proportion of conjunctions with the eight-year-olds and 9.6 for adult females and 9.2 for males.

Again comparisons were difficult to make since varying procedures were used in making the grammatical analysis. Many of the words which were considered Conjunctions in this study are labeled "adverbs" in the dictionary; that is: "however," "also," "when," while others are called pronouns. Nevertheless, it remains that when all connectors are considered from a structural aspect, as in the present data, the proportion of Conjunctions remained stable.

Determiners

The words which occur in this function group signal Class I words and include the traditional articles. However, this category is extensive and subsumes any word which might be used in place of "the" in a sentence.

Although their role is to signal Class I words, Determiners ranked below them in both number and relative frequency of use and ranked instead with Class II words. While it might be expected that the trends of the Class I and the Determiners would have been similar, such was not the case. Written Class I words exceeded the spoken and decreased with age, while the Determiners did just the opposite.

Apparently Class I words frequently required no signal and when the need to signal did arise, it was more often in the spoken language than in the written.

Like the Conjunctions the difference between the groups was significant in the spoken form while not in the written expression (Tables XXIX and XXX).

Again the differences between the groups were similar to the findings of Myklebust, who credited the hearing impaired with surpassing the hearing children in the use of articles. He, however, attributed the inequality to the fact that the deaf children used more nouns and therefore needed more articles. Obviously, this reasoning did not apply in the present study, since it was the spoken form which had the larger proportion of Determiners, but the written form, which had more Class I words. The same situation existed with the hearing children in this study, they spoke relatively more Determiners than they wrote and wrote more Class I words than they spoke.

It was true that the deaf subjects did omit Determiners far more frequently than did the hearing. They used phrases such as "played with bat ball," "put each of fish on line," "went to kitchenm," "threw it to girl," while only occasionally did the hearing children omit necessary Determiners. They used phrases as: "decided to dunk fish in the water;" "couldn't get soda at the store."

Not only did they omit, but the deaf also added unnecessary Determiners as, "the another boy," "to play a

ball," "they had a fun." The hearing children, on the other hand, contributed few examples to this error category; "a couple of more friends," "boys drinking a soda."

To illustrate further the uniqueness of structure of the deaf, the following sample spoken by a deaf child is quoted:

> A girl throw a ball to boy. The boy bat a ball. A boy bat the ball to the window, and broke the window. Mother heard the boy broke the window. Mother saw a broke the window. She went to see the ball game.

The Determiner "the" contributed greatly to the redundancy of the both groups of children. On the other hand, while the deaf made no use of "that" and "these" as did the hearing, they used "two," "his," and "four" as often. While the hearing children used limiting words "only" and "just," the deaf employed "some" and "many." Moreover, the personalizing of the human figures in the pictures, done by the hearing children, required proper names in the possessive case, and this was never done by the deaf subjects. It can be seen in List 4 that in response to one series of pictures the deaf wrote thirty-one types while the hearing employed fifty types.

Prepositions

Those words which have been observed as traditional Prepositions by grammarians keep that classification in this linguistic form class.

List 4

LIST OF DETERMINERS WRITTEN IN RESPONSE TO ONE PICTURE BY DEAF AND HEARING CHILDREN

Deaf Children		Hearing Children	
Word	f	Word	f
the	358	the	846
two	68	two	149
a	51	a	150
some	36	some	36
one	36	one	58
his	34	his	72
their	13	their	41
six	12	six	11
boy's	9	boy's	3
other	8	other	21
three	8	three	14
many	6	many	2
another	6	another	5
more	5	more	3
four	5	four	10
no	4	no	6
fishes'	2	fishes'	2
this	1	this	4
both	1	both	3
an	1	an	2
any	2	any	3
brother's	1		
those	1	those	2
seven	2	seven	2

List 4 (Continued)

Deaf Children		Hearing Children	
Word	f	Word	f
several	1	enough	1
most	1	water's	3
few	2	few	2
other's	1	day's	1
five	1	five	11
eight	1		
my	1	my	6
		only	28
		that	8
		all	4
		just	6
		out	3
		these	2
		each	2
		half	2
		much	2
		Jack's	3
		Mark's	2
		Joe's	2
		Tom's	2
		Jerry's	2
		first	2
		fifteen	2
		sixteen	3
		ten	2
		twenty	2
		every	2
		same	2

It can be seen in Figure IV that the Prepositions ranked third in the function classes. Two observable characteristics were the dissimilarity between the spoken and written samples and the great similarity between the amounts used by the two groups of subjects.

While the difference between the groups was not significant, as shown in Tables XXI and XXXII, the written Prepositions appear to be used more frequently than the spoken Prepositions at all age levels for both types of subjects (Figure IV). While the hearing group used the maximum amount at the eleven-year level in speaking, they may not have reached their maturity within the age levels studied because there is some evidence that the proportions of this particular part of speech changes at the adult level.

Templin (1957) found 8.0 per cent at age seven and 7.9 per cent at the next age, although Young (1941) attributed only 4.9 per cent to the five-year olds. While for adults, Boyd (1927) reported 9.2 per cent were Prepositions and Mann (1944) recorded 12.35 per cent for the college freshmen.

Since the procedures in making the grammatical analysis could not vary too greatly between the studies because the regular classifications are consistent, discrepancies were not anticipated among investigators. So the difference between Boyd (1927) and Mann (1944) and also Herdan (1956) who recorded only 5.2 per cent for prepositions in Dante's Comedies, must have been caused by the variations in the base

amount or the total number of words written.

That the written and spoken form differs, as is demonstrated in the present study, is substantiated by the companion studies of Mann (1944) and Fairbanks (1944). While Mann reported 12.35 per cent for the written work of college freshmen, Fairbanks credited 10 per cent to the spoken form. A greater variation was reported in their studies for the schizophrenic patients, where the written expression contained 12.33 per cent in sharp contrast to 7.48 per cent in the spoken form.

Actually this percentage resembled more that given in the data of French, Carter, and Koenig (1930), who combined the Prepositions and Conjunctions and found 12.62 per cent of the telephone conversations were in the Preposition category.

It was readily apparent that the total spoken output found in the present study were lower than in the aforementioned investigations and therefore the percentage figures of Prepositions were appreciably influenced. However, it should be noted that despite the restricting element of the stimuli, the children evidenced grossly different behavior in this part of speech when speaking.

The findings in this study resembled those of Wells (1940) who found a lack of any large differences in the use of Prepositions between the deaf and hearing groups at any grade although the deaf children used slightly more Prepositions

at grade three. Actually, the data of Wells (1940) were not too dissimilar and should be reported. He gave for deaf boys, grades III through VI the following percentages: 7.4, 7.5, 9.0, and 9.2; and for deaf girls in the same grade, he credited 8.9, 7.5, 5.7, 8.8 per cent of tokens to Prepositions.

The data of both the present study and that of Wells (1940) were unlike those of Myklebust (1960) who found "deaf children at nine and eleven years of age used this part of speech with approximately one-half of the frequency of hearing children (p. 305)." Furthermore, Myklebust found zero scores in this part of speech among the deaf population and had this to say:

> After nine years of age all of the hearing children used prepositions but some deaf children through the 15-year level did not use this part of speech. (p. 305)

Although zero scores were rare in this study, more occurred in the spoken version than in the written. Of the hearing group, six used no Prepositions and three of them were in the nine-year level. Only two deaf students used none, but they too were at the nine-year level.

The range between the two groups of children was different. While some of the hearing pupils used as many as 38 Prepositions, the maximum used by any deaf child was nineteen.

The deaf children omitted Prepositions in the situation which would make the omission an error more often than did

the hearing. They would say, "The children were afraid the person'" "A girl threw the ball base;" "The boys were same team'" "The woman disgusted the children;" and "Mother saw a broke the window." The hearing children, on the other hand, used the colloquial expressions such as "a couple kids" and "all the children."

Both groups experienced difficulty with the correct choice of Prepositions. The deaf children confused a wide variety of these words: "A boy put some fishes on a water;" "Someone is angry for him;" "He hit the ball on the window;" "Two girls visited with two boys for a baseball;" "The ball flew up in the air;" but the hearing children's choice of errors were narrowed to "in" for "into": "He threw the line in the water;" "They walked in the room."

Between the groups of subjects there was also a difference in the use to which the prepositional phrases were put. The hearing children used prepositional groups in twenty-one different ways while the deaf subjects used them in only eleven ways. The five most common phrases were those of place, time, manner, adjectival and accompaniment.

The deaf pupils were superior in the use of prepositional phrases denoting accompaniment since the hearing children only used this type in writing and then they exceeded the deaf at just three levels. The deaf were also superior in the use of phrases of place, but those of time, adjectival, and manner were used more often by the hearing children.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The present study was an attempt to describe and analyze differences between spoken and written language of deaf and hearing children, and to relate these findings to chronological age.

Five written and one spoken composition of 37 children, ages nine to fourteen years, enrolled in a private oral school for deaf children and of 100 hearing children, nine to fourteen years of age, attending regular schools in suburban communities were studied for developmental trends and syntactical features.

Analysis and comparison of the written and spoken stories were used 1) to describe gross language development by determining the number of tokens, the number of sentences, and the average sentence length by dividing the tokens into the sentences; 2) to find amount of flexibility by computing

the subordination ratio by dividing the dependent verbs by the independent ones; 3) to ascertain the vocabulary variability by determining the type-token ratio (TTR) which is the ratio of total tokens (words) to total types (different words); and 4) to examine the structural and syntactical detail by examining the relative frequency of use of lexical and structural parts of speech.

Gross Language Development

A comparison of the groups on the measures of written sentence length showed trends that were similar for deaf and hearing children with respect to age, but different for writing and speaking of both groups. Written sentences increased in length, but spoken sentences of the hearing showed not only a slight increase in length after age eleven. At all but the eleven year level the hearing children both wrote and spoke longer sentences than did the deaf children. Nevertheless it must be remembered that the size of the deaf sample was small and the variance large, hence the findings need to be somewhat tempered.

The degree of subordination, found by dividing the number of subordinate verbs by independent verbs, increased with age in the writing of hearing children. The increase with age of speaking was not as definite but observable especially when the youngest and oldest levels were compared.

Vocabulary Variability

The amount of rigidity or flexibility in word usage was determined by type-token ratio for each composition. While the overall type-token ratio appeared stable across the age range, the written and spoken type-token ratios of the hearing children were higher than those of the deaf and their spoken type-token ratio was higher than their written.

Structural and Syntactical Detail

Contrasts between forms and between groups appeared when the tokens were studied. Although both groups used a similar quantity of tokens in writing and speaking, neither group spoke as many words as they wrote, nor was the number used in writing as consistent across the age range as was the speaking.

When the words were categorized into parts of speech, the relative proportions remained stable across age levels with only Prepositions showing an increase and Determiners some inconsistencies.

Within the parts of speech, the deaf children maintained a different balance among the lexical and structural words. They exceeded the hearing in the use of Class I, Class II words and Determiners, while the hearing used more Class IV words, Auxiliaries, and Conjunctions. The deaf resembled the hearing in the proportion of Class III words and Prepositions, although the actual quantity used was less than that of the hearing. These were in most instances absolute differences with

significant differences occurring for Auxiliaries, Conjunctions, and Determiners, and at incidental age levels for some of the other categories.

While both groups wrote more Class I words and Prepositions than they spoke, the deaf spoke more Determiners than they wrote, and the hearing spoke more Conjunctions than they wrote. For the other parts of speech the differences between speaking and writing were slight.

Growth Trends

Growth trends were more pronounced in the syntactical analysis of sentence structure than they were in the features of vocabulary. With the sentence structures and with subordination ratio, changes with age were apparent, while with measures of morphemes, constancy across the age range was the pattern.

Growth trends were also more discernible in the writing of sentences than in the speaking, but it was inconsistency rather than stability that was characteristic of the spoken form. The only great difference between written and spoken vocabulary was in the totals in parts of speech, and the type-token ratio. When the categories of the parts of speech were reduced to proportions both forms of expression maintained a relatively constant relation one to the other.

Conclusions

An attempt to infer from quantitative measures of expression a factor of quality may seem too ambitious. Nevertheless, it was one of the assumptions underlying this study. While syntax and vocabulary studies have nearly always been concerned with the quantity, as this one has, it appears logical to consider diversity of sentence and vocabulary as criteria of quality apart from mere quantity of expression.

The first deduction to be made, therefore, is that certain differences between written and spoken language and between deaf and hearing children, which have been discussed in the study in terms of quantity, should be thought of as differences in quality as well. Probably the two most meaningful findings of the entire study are, on the one hand, the very obvious lack of flexibility of both sentence structure and vocabulary of the deaf subjects; and on the other, their resemblance to the hearing on the measure of total number of tokens in certain parts of speech categories. The variability has been described by the ratio of the number of different tokens (types) to the number of tokens (TTR) of the total output. Flexibility of syntax can be inferred from findings pertaining to the subordination ratio.

Deaf and hearing children exhibit both distinct similarities and specific language differences, but not on the same aspects of language. The similarities are to be found in the more concrete phases of language development, while the differences are found in the more intrinsically linguistic aspects. The differences occur as more structural forms are analyzed. For example, there is a wider gap between the groups when structural classifications are studied; that is, Auxiliaries, Conjunctions, and Determiners, than when lexical categories are analyzed.

The conclusion that this is a quality factor is based partly on the reasoning that structural classes require more control of the language, since they are the words which control the syntax and defy definition. Lexical work, on the other hand, while at times abstract in nature, can still be defined. The conclusion, however, is supported by the actual facts that show the hearing to be superior in structural vocabulary while the deaf use more lexical words.

The general inference then, to which the data lead, is that there is a practicable distinction between the deaf and hearing and that this distinction is to be found, not just in sentence structure, but in certain measures of vocabulary like type-token ratio.

This distinction is greater when language is factored into parts of speech. If the overall usage were

representative of the language expression, a different inference would be necessary and that would be that there is a practical distinction between speaking and writing and less between deaf and hearing groups.

While evidence regarding totals of words contradict the notion that auditory deprivation influences language usage, the evidence regarding subordination, parts of speech and type-token ratio might be interpreted to mean that an auditory handicap is the cause of language inabilities. Ample data have been presented to indicate that the hearing are superior to the deaf in certain forms of language development. To say that they are "superior," however, means that they use a larger quantity of some language structures as measured by parts of speech, and demonstrate greater flexibility, as measured by subordination ratio and the type-token ratio. These are set up somewhat arbitrarily as indicative of better quality.

That the deaf are not inferior in the quantity of total output, Class I, Class II words and Prepositions also is shown in the data presented.

There are certain theoretical conclusions that are in accord with the evidence that lack of hearing contributes certain differentiating factors. First of all, it is well known that Class I and Class II words are the first to be taught to deaf children and for obvious reasons--such words can be illustrated. These words can have definite reference

to some object or activity in the environment or can be defined. Contrariwise, structural words; that is, Auxiliaries, Determiners, Conjections, have few if any referents. Frequently, the meaning must be communicated either through specific teaching (usually only by example) or through incidental learning. For the hearing children it is more probably the latter where the auditory channel provides many repeated examples of the significance of structural words. A teacher of the deaf, on the other hand, will attempt to associate meaning of words like "the," "a," and "an," or such definitions as "the," "a," and "an" mean "one" and such descriptions as "the first time the object is mentioned we use 'a'," the next time "the" and the following times "it." All presentations are through a modality other than hearing, and are often as an abstracted principle. He may present the meaning of "who" in the sentence "the boy who hit the window, ran" as another word for "boy" and as the children think through "the boy who hit the window, ran" it becomes much easier for them to use the redundant but correct style, "The boy hit the window. The boy ran." To observe the teaching of the meaning of Auxiliaries impresses one even more with the futility of defining structual words such as "did" in "He did not ...," "Did you...," and "the dog did it," where it becomes a Class II word and not an Auxiliary at all.

Furthermore, language development appears to be dependent in part upon speech, as is observable in the data of the young hearing children. At the two earliest age levels the hearing children used superior language in the spoken output. The child's associations with words are fixed when he finds by trial and error that his attempts at verbalizing produce effects in his environment. The deaf child in the early years has either no means of verbalizing or at best imperfect ones that might produce such effects. Thus, his process of acquiring language is slowed. This necessitates spoken language development concomitant with written, and this can be achieved only in an orally-oriented school. The data support the conclusion that the language of deaf children approaches that of hearing children when they have been so instructed.

The investigator recommends further that generalizations not be made regarding the influence of the auditory deficit upon language, but that generalization be made only after the curriculum of the school is examined. The findings of this study confirm those of an earlier investigator (Walter, 1950) that the language product reflects the school's curriculum.

For education, specific implications arise. One, since total numbers do not give an adequate picture of language development, teachers should not be satisfied with the children's accomplishment on extensive word lists.

Two, in teaching language, more recognition should be given to the greater difficulty of structural words over lexical words. This suggests a more deliberate and definite attempt to systematize both the order and the methods of presenting structural words.

Third, it compels teachers to cease "rubber stamping" the language. The same stereotype of the language of the young deaf is found in the language of the older deaf and it leaves one dissatisfied with the acceptance that has been put upon the patterned language year in and year out; that is, "The window was broken."

Fourth, not only must the teachers utilize a wide variety of phrases, but it appears that they must stress flexibility in all vocabulary, even in concrete Class I words.

Fifth, teachers of hearing children must be aware of the limited scope of language expression both in quantity and quality that the children are using in speaking and writing.

The sixth implication for education lies in the very intangible benefit which occurs toteaching for a more complete knowledge of deaf and hearing children.

Finally, not only should teachers be concerned with the vocabulary but investigators also. The direction of their study could go in one of several directions: a) a "standard curve" after Zipf (1935) might be obtained. This curve, the frequency of occurrence of each word type

against its rank, could be a basis of more satisfactory description. However, the author cautions that both subject and language sample size be larger than either were in this study. b) a test might be devised whereby attention could be focused upon the sole of function words. Two models presently available are those of Woodward (1963), who concentrated upon words in the lexical categories (Class I, II, III, and IV) and Wells (1940), who devised a completion test requiring the use of subordinating and coordinating conjunctions. c) a ratio of function words per lexical ones might be obtained; and/or d) the multiple meanings of the words employed might be analyzed.

Perhaps the chief merit of this study lies in the tools it used and the descriptive analysis it makes of the specific language differences found to exist between deaf and hearing children. The final conclusion remains that certain language structures are qualitative in nature. They discriminate between hearing and deaf and between writing and speaking better than other structures.

APPENDIX

Since this study incorporates both grammatical and linguistic units, it is well to define the units used by the investigator.

The unit having to do with syntax was:

Subordination ratio - The ratio of the dependent clauses to the independent clauses.

The parameters of vocabulary included the units of:

1. Type-Token Ratio - The ratio of number of different words (Types) to number of words (Tokens).
2. Gramatical Categories
   a. Lexical Categories:
      1) Class I - words which pattern after "the" as in "The move was good." They also pattern before a Class II word as "he" in "He jumped." In the sentence "Tom saw the cat and dog.", there are three Class I words "Tom", "cat", and "dog".

2) Class II - words which pattern after Class I words as "was", "wanted" and "went" in the following sentences: "The movie was good.", "The boy wanted a dog.", and "He went home."

3) Class III words pattern or are like "good" in the frames "The movie was good." or "The good movie ran for a week."

4) Class IV are those words that can be substituted for "there", "thus", and "then" in "He walked there, thus, then" as "He walked home quickly afterwards."

b. Structural Categories or Function Words:

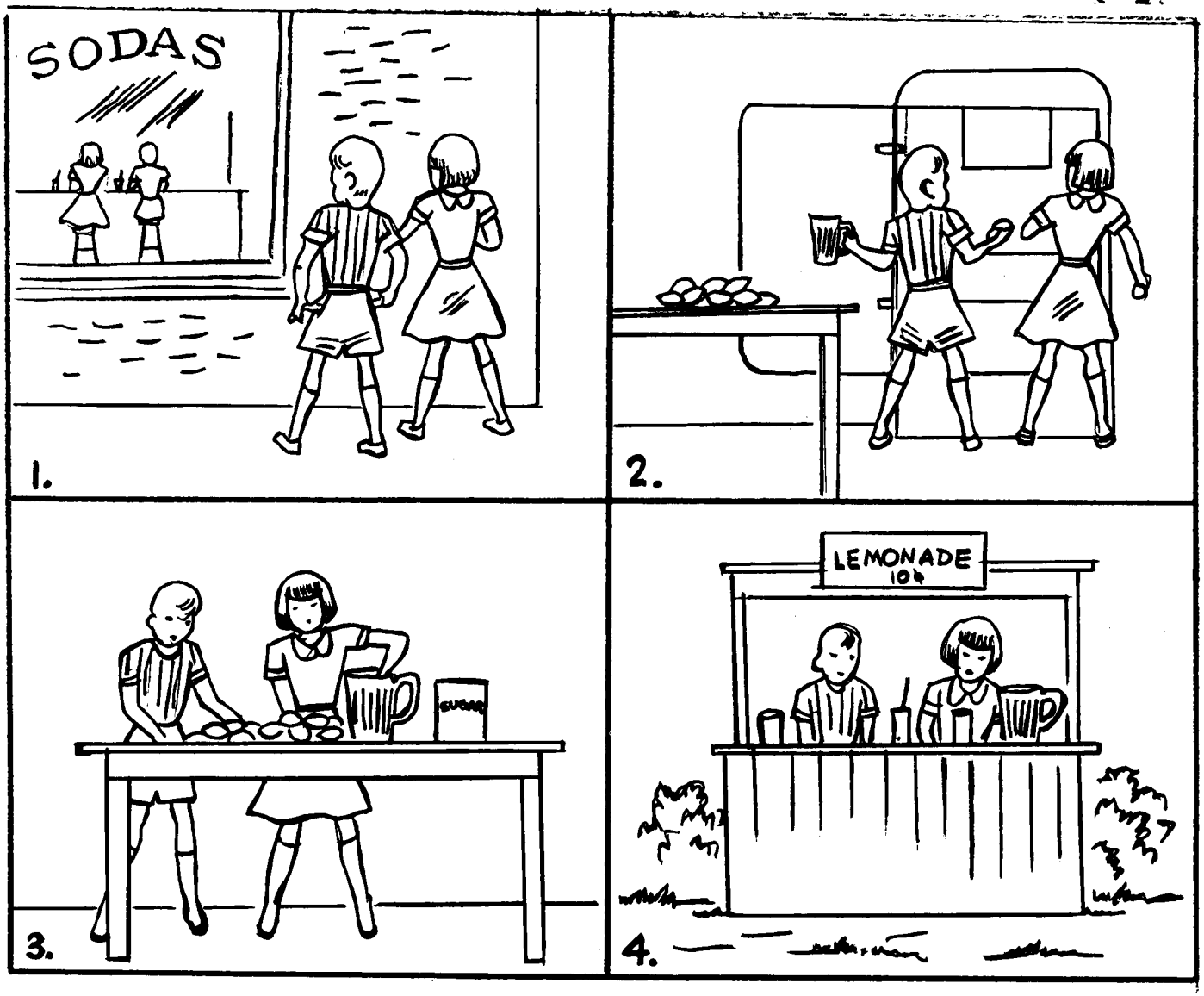
1) Determiners are words which pattern like "the", "as", "my", "your", "her", "this", "every", "a", "an", et cetera, in "The book was good" frame.

2) Conjunctions are words which stand in the various positions occupied by "and", "who" and "after" in "The boy and girl who were the Jone's children were good after their grandmother came."

3) Auxiliaries are words for the position in which the word "may" occurs in the frame "The concert may be good."

4) Prepositions are words that can stand in the various positions occupied by the word "at" in the frame "The small boy at school is at the top."

5) There are other structural categories but the small proportions of use would warrant classifying them into a general miscellaneous group.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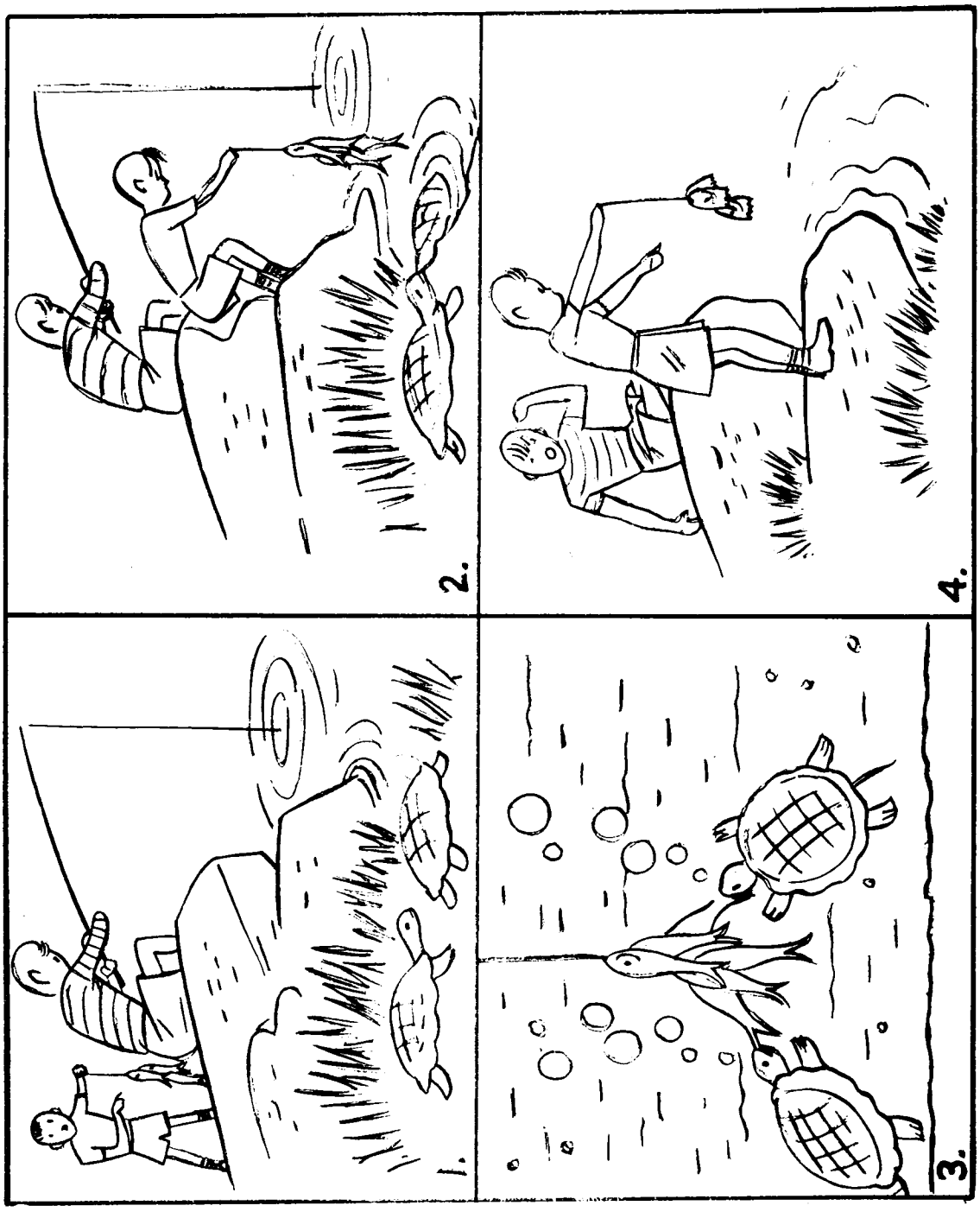

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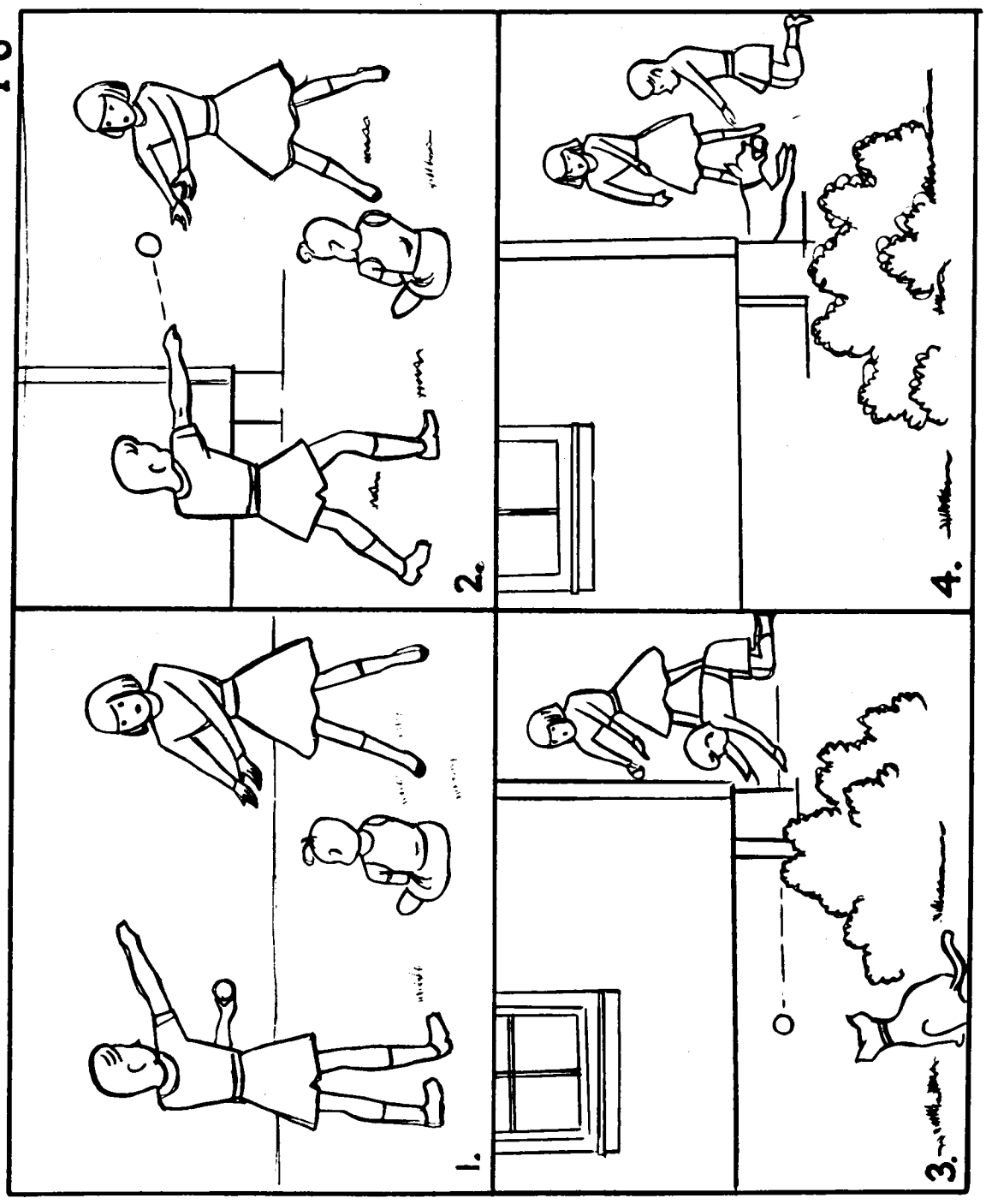

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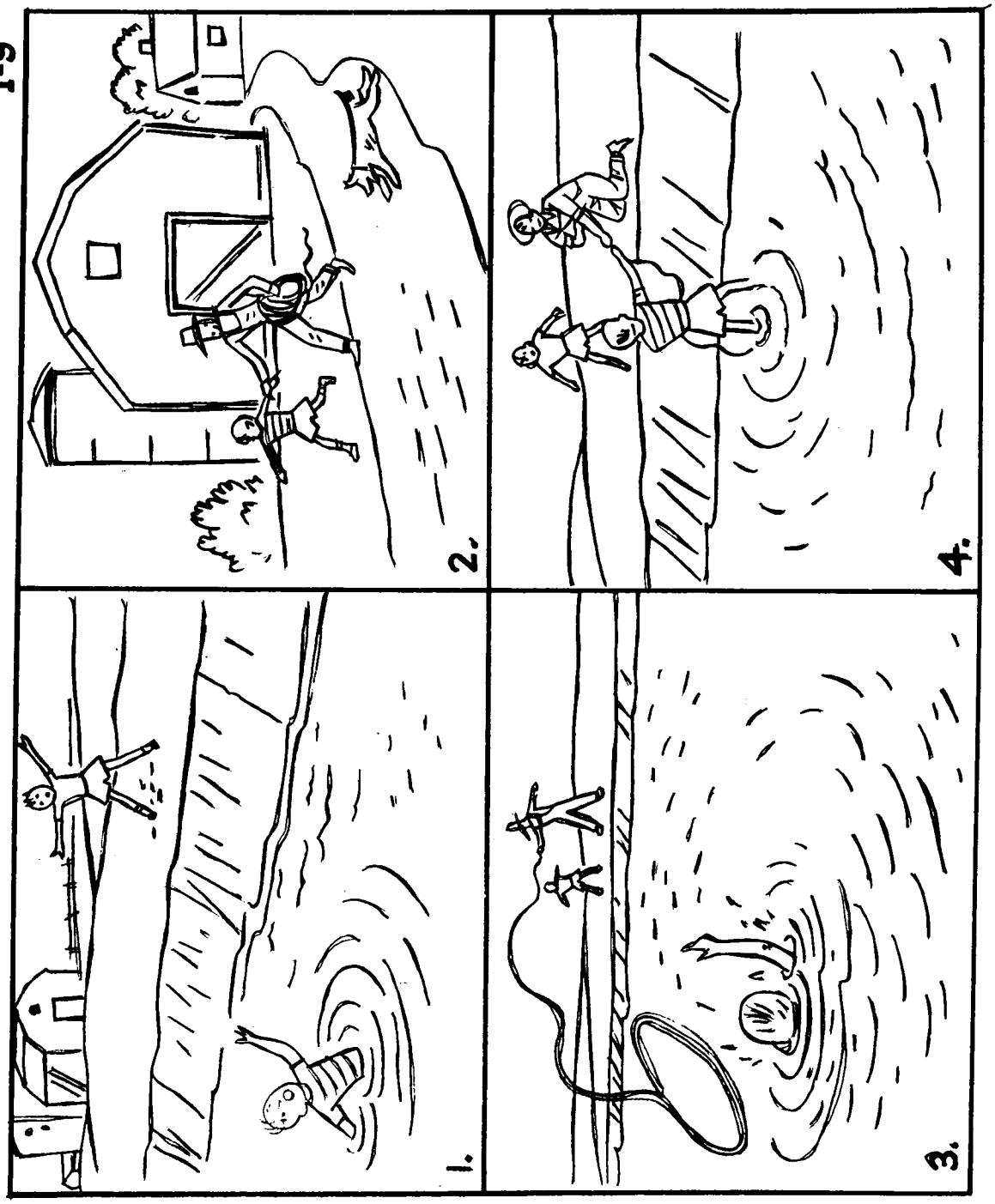

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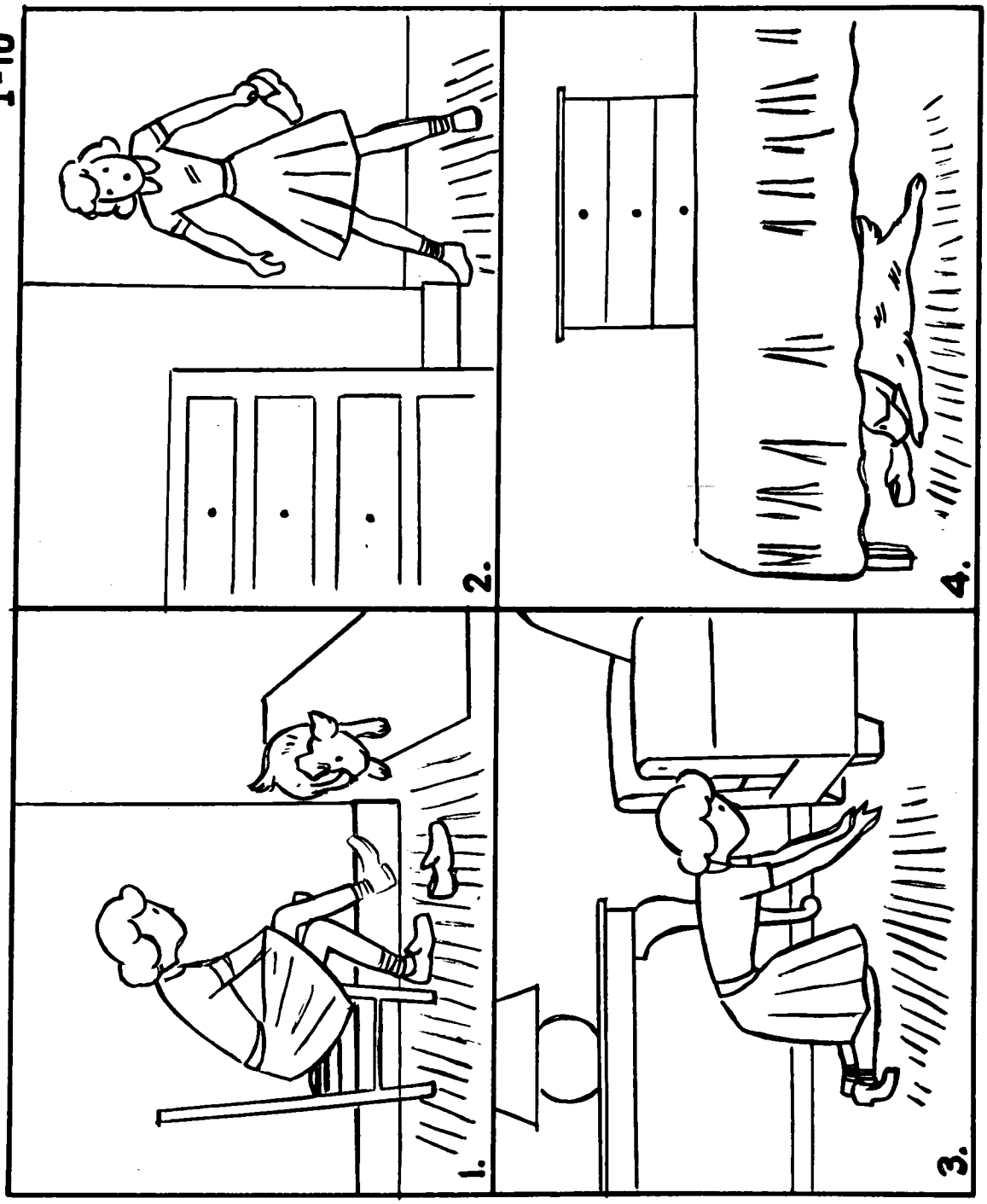

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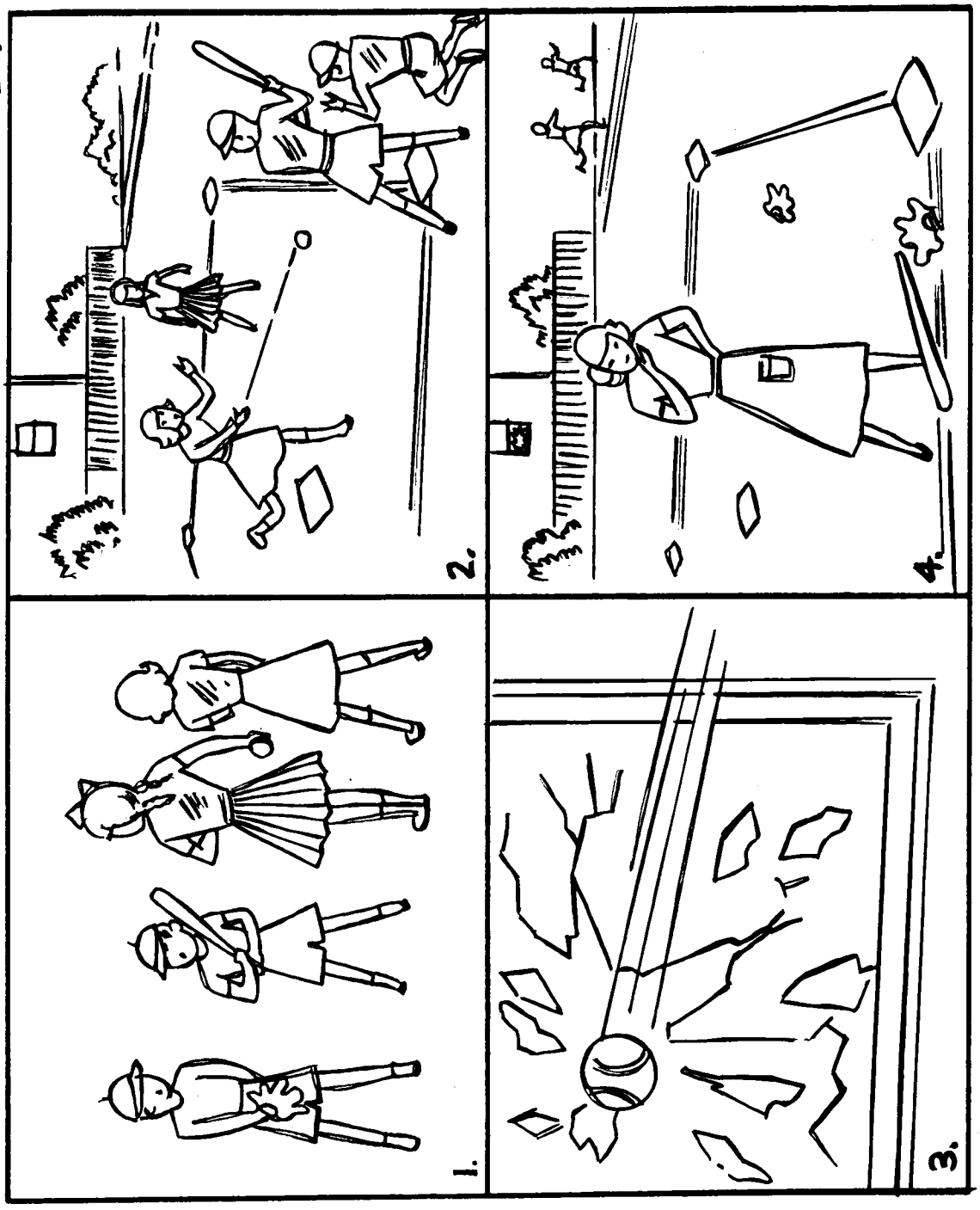

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